INTERAGENCY ADVISORY COMMITTEE ON WATER DATA

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Fiscal Year 1986

FEDERAL PLAN FOR WATER -DATA ACQUISITION

ORIGINAL
COMPLETED

U.S. Department of the Interior
Geological Survey
Office of Water Data Coordination

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Fiscal Year 1986

FEDERAL PLAN FOR WATER-DATA ACQUISITION

Prepared by the
U.S. Department of the Interior
Office of Water Data Coordination
Reston, Virginia 22092

in cooperation with the
Interagency Advisory Committee on Water Data

Note: The information on agency funding and programs for Fiscal Year 1986 in the report is confidential and cannot be provided to the public prior to the release of the President's budget.

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UNITED STATES DEPARTMENT OF THE INTERIOR

WILLIAM P. CLARK, SECRETARY

GEOLOGICAL SURVEY

Dallas L. Peck, Director

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SUMMARY

Fiscal Year 1986 Federal Plan for Water-Data Acquisition

This report is provided annually by the Office of Water Data Coordination in cooperation with the Interagency Advisory Committee on Water Data, as mandated by the Office of Management and Budget Circular A-67, "Coordination of Federal Activities in the Acquisition of Certain Water Data."

The Federal Government's water-data acquisition activities support scores of missions involving the Nation's water resources. Federal agencies are responsible for planning, designing, constructing, and operating water projects; river and flood forecasting and warning services; water-supply planning; emergency response to critical water problems, such as floods; droughts; and hazardous-waste spills; water-pollution control; international treaties and interstate compacts relating to water resources; and numerous other water-resources functions. Federal expenditures associated with these water-related responsibilities are difficult to quantify accurately, but have probably exceeded $6 billion annually in recent years.

The need for water data continues to increase as it has for the past 10-12 years. Since 1972, approximately two dozen major pieces of legislation have been enacted that require water data for implementation. Most of this legislation required new types of data because it called for the protection of the water resources and other elements of the environment rather than the more traditional functions of planning and managing for water-supply purposes.

Total estimated water-data budget requests of Federal agencies for Fiscal Year (FY) 1986 are $165 million. This represents a significant increase over the FY 1985 budget request for several agencies, although some of the apparent increases can be attributed to improved reporting. The trend of decreasing Federal outlays for water-data acquisition evident in the early 80's appears to have reversed in response to the ever-increasing need for water data throughout the Nation.

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Fiscal Year 1986
Federal Plan for Water-Data Acquisition

INTRODUCTION

Authority. The "Federal Plan for Water-Data Acquisition" is prepared each year as required by Office of Management and Budget (OMB) Circular A-67, paragraph 3b (Appendix A). Circular A-67 requires the Department of the Interior (DOI) to coordinate water-data acquisition activities of the Federal Government. Responsibility for this function is delegated by the DOI to the Office of Water Data Coordination (OWDC) within the U.S. Geological Survey (USGS). As part of the implementation of Circular A-67, the Secretary of the Interior established the Interagency Advisory Committee on Water Data (IACWD). The IACWD members represent Federal agencies that collect or use water data. The Federal Plan is prepared by OWDC in cooperation with the IACWD.

Purpose and Scope. The purpose of the Federal Plan is to provide information on water-data acquisition requirements, programs, and plans so that officials at various levels of government can use the information to analyze interagency water-data needs for Fiscal Year (FY) 1986. The Plan addresses interdepartmental issues and focuses on major Federal water-data acquisition concerns, but does not include program and budget details for individual agencies, which are provided in budget justifications prepared by the agencies themselves. The primary intent here is to highlight relationships between agencies that cooperate to meet Federal water-data responsibilities and, in addition, to give a brief background on non-Federal participation in the national water-data acquisition system.

This Plan provides an overview of Federal water-data acquisition activities, documents trends affecting water-data programs, and recommends approaches for meeting priority needs for water data. Program changes and new directions required to effectively meet varying water-resources information needs in the United States are described, and estimates of the magnitude of resources required to support needed programs are provided. The Plan documents information needs that must be recognized in short- and long-term planning and answers the question, "How well are water-data acquisition programs meeting national requirements?"

OVERVIEW OF MAJOR FEDERAL WATER-RESOURCES RESPONSIBILITIES

The scope of Federal responsibility in developing, managing, and regulating water resources and water-related programs is extremely broad, and in FY 1984, Federal expenditures related to water exceeded $6 billion. To meet the requirements of legislative mandates and other laws and directives, more than 30 Federal agencies use water-resources data to accomplish their missions. In addition to agencies whose normal activites are related closely to water resources, many Federal agencies also need water-resources information for special applications. For example, some agencies use water information in economic analyses of agricultural and industrial needs.

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For this report, major Federal water-related responsibilities are grouped under the following seven subjects: water-resources projects; public river-flow and water-supply forecasting; emergency response; pollution control; natural-resources management; treaties and compacts; and data collection, investigation, or research.

Agencies associated with each responsibility are identified in Table 1, and the type or categories of data required by the various agencies are shown in Table 2. Programs and plans of individual agencies are described briefly in Appendix B.

COORDINATION ACTIVITIES

Coordination Guidelines. OMB Circular A-67 has provided the framework for Federal agency coordination since its issuance in 1964. In early October 1982, the OMB Policy Review Task Force initiated an interagency revision of OMB circulars to identify "burdensome" requirements. Several agencies, including the USGS, responded to the request to review Circular A-67. As a followup to the request, the IACWD passed a resolution recommending to OMB that Circular A-67 be continued substantially in force, and indicating that the Committee was preparing recommendations for updating and streamlining the A-67 guidelines to reflect changes in water-resources data needs.

An Ad Hoc Work Group from the IACWD completed a version of the A-67 guidelines in late 1983. The revised guidelines were reviewed by the full IACWD membership, modified to reflect review comments, and approved by the IACWD in 1984. These revised guidelines are presented in Appendix C.

Water-Use Subcommittee. The Circular A-67 Coordination Program also focused special attention on water-use data-acquisition activities in FY 1984. After several meetings and discussions, it became clear that many agencies are interested in water-use information. At the request of these agencies, a new Subcomittee on Water-Use Information was established under the IACWD. Sixteen agencies are represented on the Subcommittee. A copy of the charter for this new Subcommittee is Appendix D.

Federal Agencies. Federal agencies cooperate to collect water data by requesting hydrologic data collection and investigations on a reimbursable basis from the USGS and each other. For example, other agencies transferred about $40 million to the USGS in FY 1984. The Corps of Engineers (COE) transferred the largest amount, $15 million, most of which was for data collection. Many other agencies exchange data routinely. For example, National Weather Service (NWS), Tennessee Valley Authority (TVA), Bureau of Reclamation (BOR), and COE share data for forecasting and reservoir regulation.

Data collected under Federal arrangements are normally stored for future use by the entire water-resources community. This large data-user service is made possible through the cooperative efforts of Federal and non-Federal organizations

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Table 1.--Major Federal Water-Resources Responsibilities, By Agency

Department/ Agency	Responsibilities						
	Water Projects	Public Fore-casting	Emer-gency Response	Pollu-tion Control	Natural-Re-sources Manage-ment	Treaties and Compacts	Data Collection, Investi-gation or Research
Agriculture							
ARS							X
ERS							X
FS				X	X		X
SCS	X	X		X	X		X
Commerce							
CEN							X
NOS		X					X
NWS		X					X
Defense							
COE	X		X	X	X	X	X
Energy							
BPA					X		X
DOE				X	X		X
FERC	X		X	X	X		
Interior							
BIA	X			X	X	X	X
BLM				X	X		X
BOM				X	X		X
BOR	X		X	X	X	X	X
FWS			X	X	X		X
USGS						X	X
NPS				X	X		X
OSM				X	X		X
Transporta-tion							
FHWA				X			X
Independent Agencies							
CEQ							X
EPA	X		X	X			X
FEMA			X				
IBWC	X		X	X		X	X
IJC				X		X	X
NRC			X	X			X
TVA	X		X	X	X		X

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Table 2.--Overview of Categories of Data Needed by Federal Agencies

Department/ Agency	Data Categories												
	Surface Water	Ground Water	Quality of Water	Water Use	Environmental Assessment	Management Effects	Basin Studies	Real-Time and Remote Sensing	Instream Use	Water Rights	Flood	Energy	Nuclear
Agriculture													
ARS	X	X	X	X	X	X	X	X					
ERS	X	X	X	X		X	X		X	X			
FS	X	X	X	X	X	X	X	X	X	X	X	X	
SCS	X	X	X	X	X	X	X	X	X		X		
Commerce													
CEN				X									
NOS	X							X			X		
NWS	X	X						X			X		
Defense													
COE	X	X	X	X	X	X	X	X	X	X	X	X	
Energy													
BPA	X			X	X			X				X	
DOE	X	X	X	X	X	X	X					X	X
FERC	X		X	X	X	X	X				X	X	
Housing and Urban Development	X	X	X	X	X						X		
Interior													
BIA	X	X	X	X	X	X	X	X	X	X	X	X	
BLM	X	X	X	X	X	X	X	X	X	X		X	
BOM	X	X	X	X	X		X					X	X
BOR	X	X	X	X	X	X	X	X	X	X	X	X	
FWS	X	X	X	X	X	X	X	X	X	X			
USGS	X	X	X	X	X	X	X	X	X	X	X	X	X
NPS	X	X	X		X	X			X	X	X		
OSM	X	X	X	X	X	X	X		X			X	
Transportation													
FHWA	X	X	X		X	X					X		
Independent Agencies													
CEQ	X	X	X	X	X	X	X	X	X			X	
EPA	X	X	X	X	X	X	X	X	X			X	X
FEMA	X	X	X	X				X			X		
IBWC	X	X	X	X				X	X		X		
IJC	X	X	X	X	X	X	X	X	X	X	X	X	X
NRC	X	X	X	X	X	X		X			X	X	X
TVA	X	X	X	X	X	X	X	X			X	X	X

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that help maintain the national data system. Some Federal agencies can obtain needed data entirely through other sources. For example, the Federal Emergency Management Agency, the Department of Housing and Urban Development, and the Council on Environmental Quality are able to obtain water data without establishing in-house collection programs. Many agencies can operate smaller in-house data-acquisition programs because the bulk of their requirements are met through cooperative programs and data sharing. Examples are the National Park Service (NPS), NWS, Bonneville Power Administration, and the Fish and Wildlife Service (FWS). In-house programs are established when special requirements cannot be effectively or economically met using existing sources.

Hydrologic data activities are indexed by the National Water Data Exchange (NAWDEX) so that the data can be shared. NAWDEX is a consortium of over 250 water-data users and collectors--Federal, State, and local governments and the private sector. The program is managed by the USGS in support of data sharing and user services.

For additional information on Federal coordination activities in 1984, see the separate section titled, "Current Conditions Data Systems," which starts on page 7.

Non-Federal Participation. Almost all Federal water-resources responsibilities are performed in coordination with State and local governments. For example, the Cooperative State Research Service serves to facilitate coordination and provide linkage between Federal programs and State components such as the State agricultural experiment stations, the 1890 land grant institutions, and forestry schools. Some responsibilities also involve coordination with organizations in the private sector having water-related interests, such as hydropower and water-supply utilities. In many instances, data to support Federal aspects of water programs are provided or funded by the private sector.

Field data and other information collected by local and State governments, utilities, universities, and industries frequently are provided to the Federal Government. More specifically, State and local agencies are the principal collectors of water-quality data. However, a significant part of the data provided by the non-Federal sector is funded through Federal grants; a significant part of the water-quality and water-supply funds spent by State environmental programs comes from the Federal Government.

State and local governments, however, help fund data collection to support Federal as well as State interests. The major program of this type is the Federal-State Cooperative Program of the USGS. In FY 1984, State and local governments contributed almost $50 million, which was matched on a dollar-for-dollar basis by the Federal Government, and used by the USGS to conduct data acquisition, investigations, and research of mutual interest. The data and results of the investigations and research are published, and the data are stored in computer files for use by other Federal agencies, non-Federal agencies, and the private sector. Thus, a significant share of the total funding for water-resources information that supports Federal missions comes from State and local governments.

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Reconnaisance of State Water-Quality Activities. The District offices of the USGS serve as a focal point for coordination with State and local agencies and the field offices of Federal agencies. For years, the USGS' Federal-State Cooperative Program has provided the basis for close coordination of programs at State level. This is especially true for the streamgaging program, which has long been conducted by the USGS with strong local financial support.

As environmental issues began to receive strong attention in the late 60's and early 70's, water-quality programs grew rapidly. This new environmental legislation also led to the reorganization of State agencies. Coordination with these relatively new agencies with water-quality responsibilities has not had the benefit of the historical cooperation that exists with streamflow data and, to some extent, ground-water programs and, therefore, its effectiveness is more difficult to evaluate.

As an effort to improve local coordination on water-quality data programs, OWDC requested USGS District offices to conduct a reconnaissance level survey of the water-quality activities of the major State, local, and Federal agencies operating within each State. This survey was conducted in each State during the summer of 1984. Although the results were highly variable, several fairly consistent findings were observed nationwide. They are as follows:

1. State agencies are the major collector of water-quality data.

2. Most State agency programs are directed toward specific program (legislated) objectives, i.e., drinking-water protection, permitting and monitoring of waste-disposal facilities, public health--swimming or other body contact sport area monitoring.

3. Ambient water-quality monitoring is not a major program of State or Federal agencies in many parts of the country.

4. Most ambient monitoring receives significant Federal funding--through the Environmental Protection Agency (EPA) or the USGS Federal-State Cooperative Program.

5. The other major Federal water agencies, such as the COE, NPS, FWS, Soil Conservation Service (SCS), and BOR collect water-quality data only for project requirements, i.e., for managing the parks, reservoirs, irrigation projects, and forests.

6. Most State agencies report that data needs are increasing.

7. Data management is a growing concern of many agencies.

The results of the survey are still being analyzed and will be reported more fully later. Also, the results of this survey support earlier perceptions that water-quality activities were not adequately indexed and that data dissemination and exchange could be improved if better coordination mechanisms were developed. In response, the USGS has begun studies in two States (Colorado and Ohio) to document, in detail, the total water-quality program--to find out who is doing what, for what purposes, the costs, and how are the data handled, stored, interpreted, and shared. We expect these studies will be completed in the early summer of 1985. The results will be evaluated to determine if similar studies in the other States are warranted.

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TRENDS AFFECTING WATER-DATA PROGRAMS

The FY 1984 Federal Plan discussed several factors that seemed to be affecting water-data activities of more than one Federal agency. These same trends were identified again in the FY 1985 Plan. Most of these same factors are still affecting Federal water-data programs. They are:

1. Increased use of automation.
2. Increased use of satellite telemetry.
3. New data-management systems.
4. Increased river-basin studies.
5. More dependence on historical data.
6. More environmental legislation.
7. Increased need for hydrologic information in small basins.
8. New Federal policies.

The new Federal policies of the early 1980's, however, are now incorporated into operational programs and their impact has diminished. A number of different agencies have identified several new environmental issues that will be impacting agencies' programs for future years. These are discussed in the section, "Planned Adjustments of Water-Data Programs."

CURRENT CONDITIONS DATA SYSTEMS

The first three trends mentioned in the previous section--automation, satellite telemetry, and data-management systems--relate to an important class of water-data-acquisition activities, which we call current conditions data systems. Because these systems are of vital interest to many agencies, they are discussed in some detail in this section.

Current conditions data systems support critical operational missions. For water-resources management, the major operational missions fall into two categories--water control and hydrologic forecasting. Water control is primarily associated with reservoir regulation, which is necessary to assure that hundreds of major projects operated by Federal agencies meet their congressionally authorized purposes. These purposes include flood control, hydropower, water supply, navigation, fish and wildlife instream use, and recreation. Major agencies performing water-control functions are COE, BOR, and TVA. Every year, billions of dollars hinge on water-control decisions made by Federal agencies using current conditions data.

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Hydrologic forecasting has two major aspects--river forecasting and water-supply forecasting. River forecasting involves flood warnings, daily estimates of river levels for navigation and other interests, and information on river flows during droughts. Public river forecasting and flood warnings are the responsibility of the National Oceanic and Atmospheric Administration (NOAA)/ NWS. Water-supply forecasting is a major function in the West, where snowmelt is the major source of supply. SCS and NWS make water-supply predictions under a cooperative arrangement. These forecasting missions also affect billions of dollars of investment each year.

Agencies involved in water control and forecasting work closely together to obtain and exchange information. This is because their missions are interdependent. For example, water-control managers use forecasts of precipitation, temperature, streamflow, snowmelt, and other data to decide how water should be stored or released in reservoirs. Forecasters use reservoir release information to estimate flows downstream. All these agencies need measurements of river stage, discharge, temperature, rainfall, snow depth, snow water equivalent in the pack, and other data to trace current water-quantity conditions.

For much of this century, current-conditions data were acquired and transferred manually. Observers traveled to measurement sites, took data readings, went to a telephone or radio, and called a processing center to report the data. People at the center took the calls, formated data from numerous locations, performed calculations, and made decisions. The decisions and related information were then transmitted to other offices by voice and teletype. This procedure is still in use today. However, it is manpower intensive, time consuming, and frequently less reliable than more modern approaches.

The situation has changed appreciably in the last 5 years. During that time water agencies have made significant progress in implementing cost-effective new technology. Much of the technology has come as spinoffs from the space program. Major accomplishments have been in telemetering water data from remote measurement sites to processing centers, and in using computers to receive, process, display, and transmit water control and forecasting information. Each of these aspects are discussed below.

In the last half decade, water-resources agencies have made major investments in the Geostationary Operational Environmental Satellite (GOES) Data Collection System (DCS). This system is operated by NOAA/National Environmental Satellite Data and Information Service (NESDIS). The GOES DCS is used to telemeter data from over 2,000 in-situ measurement sites all over the Nation. Normally data are transmitted every 3 or 4 hours, but some equipment can detect critical conditions and begin transmitting more frequently. Radio transmitters for use with GOES are now available off-the-shelf, and existing automated measurement stations can be upgraded with satellite telemetry for about $4,000-$6,000 each. Also, the costs for small receiving stations for GOES DCS have dropped substantially to less than $100,000 for a Direct Readout Ground Station.

Affordable costs are not the only characteristic of GOES DCS, which makes it attractive for water-resources management. GOES is very reliable. Recent experience has been that GOES stations continue to operate after other systems

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fail. Sometimes they have been the only source of data during major floods. In part, this is because the satellite is 22,000 miles in space and not vulnerable to adverse weather, falling trees, and other hazards. Many GOES operators report reliabilities above 95 percent.

Another approach used to telemeter data from remote hydrometeorological measurement stations is meteor burst technology. Meteor burst systems bounce radio signals off meteor trails to transfer information. SCS completed installation of such a system in 1980, and it is called SNOTEL (Snow Telemetry). Hydrometeorological data are transmitted from 490 high elevation sites in the Western United States and collected at two master (receiving) stations. The receiving stations have a range of up to 1,200 miles. Radio transmitter-receivers for data sites are available for $5,000-$6,000. A complete data site including a minimum of three sensors, an equipment shelter, and a power source can be installed for $15,000-$18,000. The meteor burst system has proven to be very reliable with most sites performing in excess of 90 percent reliability in the extreme weather conditions of the mountainous West.

Minicomputers are also an important new breakthrough in handling current conditions water data. Data from GOES and other telemetry systems are fed automatically into powerful, but small, computers. The computers then perform data reduction tasks, simulation and analysis, graphics display, and data distribution to other offices. This frees people for other tasks. The major water control and forecasting agencies already have minicomputers or are in the process of installing them.

Hardware is not the major concern. Software is, and agencies are working together on this problem. Several important interagency coordination initiatives occurred in FY 1984. Over several years, the NWS developed a Standard Hydrometeorological Exchange Format (SHEF) for computer-to-computer data exchange. The NWS and COE are using SHEF under an interagency agreement called TRADE (Test Reliability and Data Exchange). At the request of NWS, a technical working group (TWG) was established under the Circular A-67 water-data program to coordinate standard formats and procedures for current conditions data exchange for all agencies.

On another front, SCS sponsored a highly successful interagency Workshop on Hydrologic Models for Water-Supply Forecasting. The nine agencies participating in the workshop developed coordination recommendations and proposed actions which are being addressed by appropriate groups under Circular A-67. A copy of their recommendations is provided in Appendix E.

Also, OWDC and the Office of the Federal Coordinator for Meteorological Services and Supporting Research began meeting regularly to identify collaboration opportunities between the Circular A-67 and Circular A-62 programs. The effort already has resulted in major benefits including joint sponsorship under A-67 and A-62 of an interagency group to coordinate hydrometeorological satellite telemetry requirements.

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This group is called the Satellite Telemetry Interagency Working Group, and one of its first tasks will be to assist in updating the Federal Plan for Collection of Meteorological Data from Satellites. This update is critically needed because expansions of water-management applications using GOES DCS have begun to outstrip the ability of the NESDIS ground-receive facilities to support the system. This saturation problem was identified 2 years ago, and in FY 1985 this problem is expected to get worse. The NOAA budget request for FY 1986 contains funding to upgrade their DCS ground-receive facilities. The item is titled, "GOES-Next Ground System," and the amount is $3.9 million. OWDC and member agencies of the IACWD strongly support that request. Enhancement of the GOES ground facilities is closely tied to continued improvements and expansions in the information systems for water management. Resource-effective upgrades, which require satellite telemetry, will be jeopardized by the saturation problem. Currently, the GOES DCS has over 4,800 data-collection platform (DCP) addresses in it, and will likely reach its limit of 5,000 addresses by early 1985. The requested funding will allow expansion of the DCS to 12,000 DCP's. This issue directly affects major water resources GOES DCS users, including COE, BOR, NWS, USGS, Bureau of Land Management (BLM), Forest Service (FS), and SCS.

PLANNED ADJUSTMENTS OF WATER-DATA PROGRAMS

Estimated FY 1986 budget requests for water-data acquisition are reported by agency in Figure 1. Funding is reported for data collection and exchange programs supported by the Federal Government. The programs include existing or planned field data collection, transmission, initial processing, and dissemination. These data are collected for streams, lakes, reservoirs, estuaries, and ground water, and describe quantity and quality characteristics of water. Also included in these programs are laboratory activities associated with analyzing water samples for chemical, physical, and biological characteristics.

Estimates provided in Figure 1 represent anticipated budget requests by each agency; transfers of funds are not shown. As mentioned earlier in this report, funds are transferred among Federal agencies and from Federal agencies to State agencies and vice versa.

Appendix B summarizes the Federal agency missions and contains brief program statements describing the acquisition and use of water data. Included in these summary statements are each agency's water-data needs and, where applicable, FY 1984-1986 base programs, and changes and data needs in 1987 and beyond. As can be seen from these statements, many agencies are planning program changes to respond to environmental-quality concerns. The key concerns for the late 80's appear to be ground-water quality, toxic pollutants, toxic-waste management, ground-water quality research, nonpoint-source pollution, and other environmental-quality issues.

EPA is planning a major activity to protect the Nation's ground-water resources. In August 1984, they published their Ground-Water Protection Strategy, which describes planned activities and identifies ground-water contamination as a major environmental issue of the 80's. They have already begun to implement the protection strategies which contain the following core elements:

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1. Strengthen State ground-water programs.

2. Cope with currently unaddressed ground-water problems.

3. Create a policy framework for guiding EPA programs.

4. Strengthen internal ground-water organization.

CONCLUSIONS

Total estimated water-data budget requests of Federal agencies for Fiscal Year (FY) 1986 are $165 million. This represents a significant increase over the FY 1985 budget request for several agencies, although some of the apparent increases can be attributed to improved reporting. The trend of decreasing Federal outlays for water-data acquisition evident in the early 80's appear to have reversed in response to the ever-increasing need for water data throughout the Nation. Recent improvement in the Nation's economy provides encouragement that Federal water-data activities will not be further impacted, and that critical Federal data-acquisition activities will, in fact, be expanding to meet the increasing demands of a growing economy.

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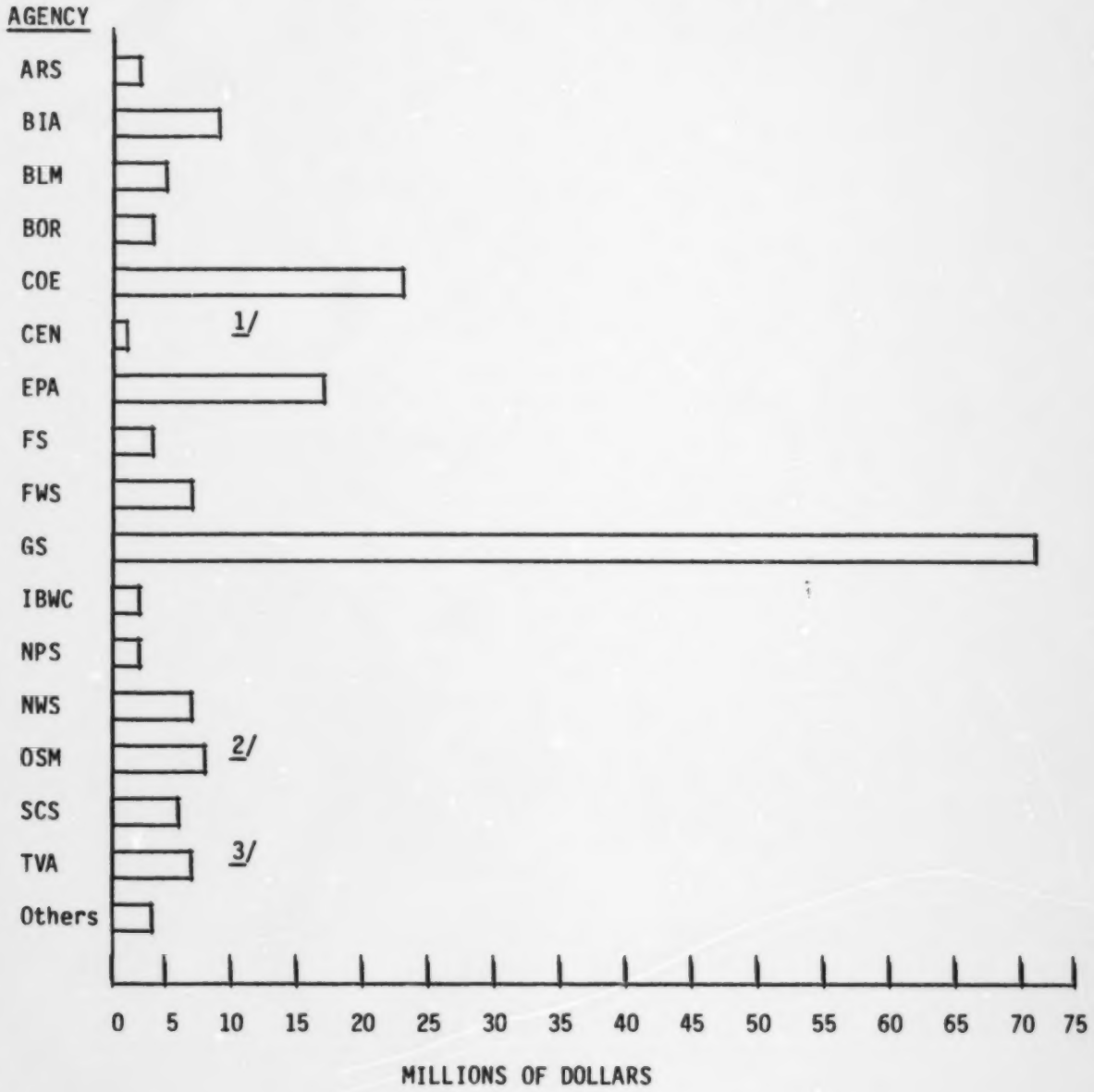
Figure 1--Estimated Federal Agency Water-Data Budget Requests, Fiscal Year 1986



1/ Less than 1

2/ Primarily for the Small Operator Assistance Program (SOAP)

3/ Total project funding; includes data acquisition and resource-management plan development

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APPENDIX A

OFFICE OF MANAGEMENT AND BUDGET
CIRCULAR A-67

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EXECUTIVE OFFICE OF THE PRESIDENT
BUREAU OF THE BUDGET
WASHINGTON, D.C. 20503

August 28, 1964 CIRCULAR NO. A-67

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Coordination of Federal activities in the acquisition of certain water data

1. Purpose and coverage. This Circular prescribes guidelines for coordination of Federal activities in acquiring water data from streams, lakes, reservoirs, estuaries and ground waters. Included in such activities are the obtaining of quantitative and qualitative data, their processing, publication, and storage. Excluded are activities concerned with research plots and experimental watersheds, and data on precipitation, evaporation, snow accumulation, and soil moisture.

The Geological Survey of the Department of the Interior acquires basic water data on the water resources of the Nation. A number of other agencies acquire special water data in support of their respective missions. The basic and the specialized activities need to be closely and continually coordinated to assure effective and economical management of resources in meeting essential user requirements.

The guidelines outlined in this Circular contemplate that (a) the Department of the Interior will operate a national network for acquiring water data; (b) the user agencies will arrange for the acquisition of specialized water data that cannot be provided efficiently, and in a timely manner, through the national network; (c) certain procedures will be followed to facilitate close interagency consultation in the acquisition of water data; and (d) the Department of the Interior will conduct a continuing and systematic review directed toward efficient coordination of Federal water data acquisition activities.

Agencies needing particular water data in support of their missions will, to the extent practicable, be responsible for funding for the attendant data acquisition activities. The Bureau of the Budget will assist agencies in effecting adjustments in funding arrangements required to conform with the division of responsibilities set forth in this Circular.

2. Responsibility for water-data acquisition.

a. The Department of the Interior is responsible for the design and operation of the national network for acquiring data on the quantity and quality of surface and ground waters, including sediment load of streams. Except as set forth in paragraph 2b below the network will meet the water quantity measurement requirements of all Federal agencies and will provide water quality measurements common to the needs of two or more agencies.

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b. Departments and agencies whose operating requirements cannot be met efficiently through the national network, including appropriate adjustments therein, will arrange for specialized data acquisition. Determination as to the need for specialized data is entirely the responsibility of the user agencies.

Such data are normally obtained in circumstances characterized by:

(1) short observation periods, e.g., measurements of streams during low flow to determine their capacity for receiving waste;

(2) unstable quantity and quality parameters, e.g., measurements of the drastic changes in dissolved oxygen content resulting from industrial pollution;

(3) need for costly and rarely used instrumentation, e.g., gas chromatographic equipment to measure minute concentrations of organic chemicals resulting from pesticide residues;

(4) concentration of measurements within a limited reach or area, e.g., measuring surface profiles of water for the design of levees in flood control programs;

(5) need for special skills not available in the agency operating the national network, e.g., detecting the presence of viruses and related living and physical properties;

(6) need for immediate reporting of data, from either a national network or special station, e.g., reports required for river forecasting.

c. In operating the national network the Department of the Interior will utilize the services of other agencies in acquiring national network water data when such cooperative arrangements are more effective or economical than having the Department acquire such data. Conversely, agencies needing water data to meet their special operating requirements should first determine the availability of the services of the Department of the Interior. Only if such a cooperative arrangement or use of other agencies' facilities is found by the user agency, after consultation with potential cooperating agencies, to be less efficient or clearly impracticable, will the agency undertake data acquisition activities. Each agency will coordinate its activities with those of a similar nature being conducted under state and local auspices.

d. The Department of the Interior will maintain a central catalog of information on national network and specialized water data and on Federal activities being planned or conducted to acquire such data. That Department, with the assistance of user agencies, should organize the national network data and catalog of information on specialized data in such form as to facilitate maximum use by agencies and other interested parties of the cataloging facilities. In addition, user agencies will maintain on file such water data as are necessary in the efficient conduct of their respective operational missions, and to respond to requests for specialized data and their evaluation and interpretation.

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3. Procedures for coordination.

a. The Department of the Interior is responsible for exercising leadership in achieving effective coordination of national network and specialized water data acquisition activities. The Department, with the participation of other agencies concerned, will undertake review of water data requirements and activities with the objectives of (1) identifying common needs for water data and establishing, and revising as appropriate, national network data acquisition activities, (2) advising user agencies promptly of the extent to which the national network can meet their special requirements for water data, and (3) achieving optimal coordination of network and specialized data activities in order to meet, effectively and economically, the variety of needs for water data. With the advice and assistance of other agencies concerned, the Department will establish procedures designed to carry out its responsibilities under this Circular.

b. In consonance with procedural objectives in paragraph 3a above the Department of the Interior will prepare and keep current a Federal plan, and the status of its implementation, for the efficient utilization of network and related specialized water data acquisition activities. Planning should be directed towards the establishment of both long-range and intermediate agency objectives and the development of water data acquisition activities related to both sets of objectives. The plan should clearly identify planning assumptions, any unresolved interagency issues, and the views of the agencies concerned. The Department of the Interior should assure that the plan, relating proposed activities to fiscal year and longer range objectives, is available for review of the various agencies' budgets for fiscal year 1966 and for annual previews of the budgets thereafter.

In preparing and revising the plan, the Department of the Interior will obtain the advice and assistance of the principal agencies providing or utilizing water data. The Department should exercise leadership in assuring that differences of opinion are resolved expeditiously.

c. Any major differences among agencies with respect to matters within the purview of this Circular, that cannot be resolved through consultation, may be referred by the head of any agency concerned to the Director of the Bureau of the Budget.

ELMER B. STAATS
Acting Director

(No. A-67)

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APPENDIX B

AGENCY MISSIONS AND PROGRAM STATEMENTS

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DEPARTMENT OF AGRICULTURE

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Agricultural Research Service (ARS)

Agency Data Needs--Base Program and Changes (1984-1986). As a Federal research agency, ARS: (1) addresses problems that are of legitimate national concern: (2) conducts research that is appropriate for the Federal Government; and (3) exploits the unique capabilities of ARS scientists and the facilities they operate--a combination that forms an integrated and coordinated national resource that is not duplicated by others in the full U.S. Agricultural Research and Development System.

ARS has identified six categories of research with specific objectives for each. The need for water data is associated with the "Soil and Water Conservation" research category with the objective, "to develop the means for managing and conserving the Nation's soil and water resources for a stable and productive agriculture." Related research programs require onsite monitoring of climatic and environmental factors together with ground water and streamflow data (quality and quantity) as needed for the "watershed development" studies. Improved technologies are needed for assessing changes in the quantity and quality of water resources. As the competition for water grows, accurate and timely information about changes will be vital for making the best use of that resource, which generally is the most limiting factor in agriculture.

Most of the ARS requirements for water data and related information that might be needed for analyzing and interpreting experimental observations are met in-house. Water data are also obtained from other Federal and State agencies.

The number of ARS studies requiring water data varies from year to year depending on the scope and duration of the separate investigations. As of January 1, 1984, about 170 individual study areas, ranging in size from less than 0.5 acre (0.2 hectare) to over 207 square miles (536 square kilometers) were collectively in operation at major watershed research study headquarters at University Park, Pennsylvania; Coshocton, Ohio; Athens, Georgia; Oxford, Mississippi; Columbia, Missouri; Temple, Texas; Chickasha, Oklahoma; Tucson, Arizona; and Boise, Idaho. Continuous streamflow measurements, supported by about 360 continuous recording precipitation stations, are obtained on all research watersheds. Water data in the form of plot runoff, soil moisture, evaporation, and other parameters are obtained at about 55 other locations in the 50 States and Puerto Rico.

Water (hydrologic) data obtained by ARS are summarized by calendar years as they become available, and are published in annual volumes and made available to all requesters. An ARS hydrologic data bank (computerized) has been developed and is maintained by the Water Data Laboratory in Beltsville, Maryland. ARS is an active member of the National Water Data Exchange (NAWDEX). About 300 ARS watershed studies are indexed in NAWDEX.

No major program changes are planned for 1985 and 1986. Increased activity is anticipated in the following phases: (1) salinity control strategies for the Colorado River Basin; (2) effective use of precipitation in agricultural areas; (3) snow management; (4) work on improving the quantity and quality of water

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supplies; and (5) technology for improving food and fiber crops per unit of water consumed, for both irrigated and nonirrigated crops. Little change is expected in the ARS efforts related to the assessment of water quality. Watershed monitoring study activities are planned to be decreased. Special emphasis will be placed on concerted national efforts to develop and assemble mathematical models for: (a) evaluating nonpoint-source pollution; (b) determining the effect of erosion on crop productivity; (c) combining soils information, including hydraulic and hydrologic properties, with land-management practices to determine the combined effects of runoff; and (d) rangeland management, using components of soils, hydrology, plants, climate and animals. Following development of these special models, considerable effort will be devoted to their improvement as well as improvement of existing models.

Future Data Needs and Plans (1987 and Beyond). Develop technology for assessing and predicting long-term changes in quantity and quality of soil, water, and air resources available to agriculture; develop improved water-management systems and practices to achieve effective and efficient use of water resources; and develop subsystems and models that integrate the use of soil, water, and air resources for optimum management of major land-resource areas.

ARS is in the process of developing a plan for ground-water quality research. The primary thrust of the program will be the development of procedures for controlling contaminants of ground water by agricultural chemicals, mainly plant nutrients and pesticides.

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Cooperative State Research Service (CSRS)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of CSRS is to represent the Secretary of Agriculture, and to carry out the intent of the Congress by administering formula and project grant funds, which Congress appropriates for support of agricultural research conducted by State research institutions.

CSRS administers the Hatch Act, Evans-Allen Act, McIntire-Stennis Act, and other legislation supporting agricultural research at State agricultural experiment stations and other State institutions, and provides coordination for agricultural research activities among States, between the States and the U.S. Department of Agriculture, and among Federal agencies.

The CSRS staff administers research programs, participates in State and Federal research priority setting processes, and maintains and promotes efficiency and coordination in the State agricultural research system using Federal funds for institutional research programs. Staff activities include participation on regional and national coordination research committees, participation on advisory and administrative committees, review of program and departmental research efforts, communication of research results to the public, information dissemination to legislators, assistance in research priority setting, administration of special research grants, and, in general, service as a coalescing point for research in the State agricultural system.

Future Data Needs and Plans (1987 and Beyond). CSRS does not envision significant changes of base programs or new thrusts for 1987 and beyond.

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Economic Research Service (ERS)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of ERS is to conduct a national program of research and policy analysis on economic and environmental factors relating to the use, conservation, development, management, and control of land and water resources in agriculture.

Data are needed to assess the adequacy and efficiency of water use, competition by agriculture for limited water supplies, cost effectiveness of production practices, and policy measures to improve water quality in rural areas. Water quantity and quality data available from Federal and State agencies are used in economic analyses. Investments, costs and other economic data related to water resources are obtained from the Agricultural Census and the ERS Resource Economic Survey (RES). These data are used to evaluate emerging trends in farm and nonfarm water use, productivity of water resources in agriculture, competing uses for water supplies, alternative policies for managing water resources, impacts of water-quality protection measures, and public and private resource development and conservation expenditures.

ERS does not collect physical data on water quantity or quality. However, the Natural Resource Economics Division (NRED) of ERS conducts economic studies on the extent and impacts of ground-water mining and studies on alternative irrigation systems for water conservation. NRED also conducts studies to identify the linkage between agricultural nonpoint-source pollutants and impaired water uses, and to assess the extent of damage attributable to agricultural sources.

Plans have been developed to initiate a RES to obtain national and regional data in Fiscal Year (FY) 1984 and FY 1985. A 5-year rotating schedule will be followed thereafter to obtain economic information about soil conservation and water-quality improvement practices; landownership; land use; conversions and improvements; and water use, sources and irrigation practices.*

Future Data Needs and Plans (1987 and Beyond). ERS plans to develop a national data base of socioeconomic information about agricultural land and water resources. The data system will be designed to compile economic data from RES and other sources and relate it to physical data collected by other agencies.

*The cooperative program of river-basin studies conducted with the Soil Conservation Service and the Forest Service was phased out in 1984 and those resources reassigned to land and water-economic studies.

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Forest Service (FS)

Agency Data Needs--Base Program and Changes (1984-1986). The FS is responsible for multiple-use management of public lands within the National Forest System. The National Forests are managed for all resources while maintaining and enhancing the quality and quantity of water delivered from National Forest lands. Forest Service Research conducts studies to determine the effects of forest land-management activities upon water quantity and water quality. State and Private Forestry provides technical support and financial assistance to the States to improve water-resources management on State and private forest and rangeland.

In order to make sound land-management decisions, FS needs data and information related to existing water quality, water quantity, and water use. Monitoring as defined in Forest Land Management Plans will be required to evaluate the effectiveness of prescribed management practices in meeting FS water-management goals. Data collected by Forest Service Research will help to better define cause/effect relationships between land-management practices and impact on the water resources. To increase cost-effectiveness, the FS uses existing data collected by other agencies where possible, rather than initiating major internal data-collection efforts.

FS data collection will continue to focus upon watershed research, specific projects, and special situations. Budget projection forecasts declining data-collection efforts through 1986. These reductions will affect water inventories and monitoring, plus data needed for watershed improvements and water rights.

Research will continue to focus on analysis of existing long-term data, development of long-term trends, short-term experiments for evaluation of hydrologic processes, and development of predictive models. The National Forests will focus on that monitoring necessary for Forest Plan evaluations.

Future Data Needs and Plans (1987 and Beyond). FS does not envision significant changes of base programs or new thrusts for 1987 and beyond.

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Soil Conservation Service (SCS)

Agency Data Needs--Base Program and Changes (1984-1986). To accomplish its mission, the SCS, in cooperation with State and local governments and other Federal agencies, carries out programs of basic soil and water conservation, watershed protection, flood prevention, cooperative river-basin surveys and investigations, Great Plains conservation, water quality, and resource conservation and development. Each of these programs requires water and related data for planning, design, and construction. The majority of SCS programs are carried out in rural areas in small drainage basins where little or no water data are available. Despite significant increases in available data from these kinds of areas over the past few years, a large unsatisfied need still exists. Information required from these data-deficient areas is usually obtained from a rainfall-runoff model or from a regional study of available data. Other water-data needs are met by a variety of techniques including in-house data-collection activities, Federal-State Cooperative programs, and cooperative arrangements with other Federal agencies.

SCS has installed 490 automated data sites in the Western mountains where snow and related hydrometeorological data are collected primarily for developing water-supply forecasts. Snow-water equivalent and depth are collected by manual techniques at an additional 1,100 locations.

Measurements of surface-water flow, inflow, outflow, or both, are being made at several hundred proposed or constructed impoundments for planning, evaluation, and reservoir operation.

Water-quality measurements are being made on a systematic basis in five experimental Rural Clean Water Program (RCWP) Projects in Idaho, Vermont, Illinois, Pennsylvania, and South Dakota. The latter two projects were begun in Fiscal Year (FY) 1983 and emphasize primarily the effects of conservation practices on ground-water pollution from nitrates. Comprehensive monitoring is also being done on a P.L. 566 land-treatment watershed in Vermont. All of these projects are scheduled for a 10-year life running through 1990-1992. At an additional 16 RCWP projects, water-quality data are collected utilizing State agency facilities and staff. The goals of these projects are to evaluate the effect of implementing conservation practices on surface- and ground-water quality.

As a part of the Colorado River Basin Salinity Control Plan (CRBSCP), SCS has initiated a comprehensive 10-year monitoring and evaluation plan for the Grand Valley, Colorado, and Uinta Basin, Utah, salinity-control projects. The SCS effort will focus on monitoring on-farm irrigation water-management practices, efficiencies, and impacts on approximately 30 farms each year in each project. Off-farm monitoring of streams and the Colorado River will be continued through the 20-station network administered by the U.S. Geological Survey and the Bureau of Reclamation. Continuing the basin-wide monitoring network is important to complement the on-farm and site-specific information collected by SCS.

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In addition, more than 100 project areas are under study to determine effects of conservation practices on water quality. This involves approximately 500 locations where water quality and quantity are measured. These are short-term records (3-5 years).

Additional automated sites, where snow and related hydrometeorological data are collected, are being installed as funds permit, and a substantial number of manually-read sites will be reduced. Emphasis will be given to adding other hydrometeorological parameters (up to 16) at existing automated sites.

Due to a slowdown in both watershed planning and construction programs, fewer surface-water inflow measurements will be made on proposed or constructed impoundments.

Pending funding for expanded implementation initiatives, it is anticipated that two small salinity projects will be initiated in FY 1985 and that a large salinity control project will be initiated in FY 1986. These new projects will have monitoring programs similar to the Grand Valley and Uinta Basin projects. On-farm and off-farm monitoring will be complementary components necessary for measuring salt load reduction impacts on the Colorado River.

Future Data Needs and Plans (1987 and Beyond). Plans are to phase out many manual snow and related hydrometeorological measurements, particularly those measured directly by SCS, and to rely more heavily on automated sites for forecast purposes.

Streamflow measurement for water-resource planning and for reservoir operation will continue on an as-needed basis.

Monitoring for the five RCWP projects will continue until at least 1990.

On-farm implementation programs in connection with the CRBSCP are scheduled to continue until the year 2000. Approximately five additional projects will be implemented during this period with continued on-farm and basinwide monitoring to measure program effects.

There is significant concern for maintaining and improving ground-water quality, but the SCS role is not well defined at this time.

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DEPARTMENT OF COMMERCE

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Bureau of the Census (CEN)

Agency Data Needs--Base Program and Changes (1984-1986). In cooperation with business and industry, government, and other public or private organizations, the mission of CEN is to conduct censuses and surveys and otherwise collect, process, and analyze statistical data relating to the social and economic activities and characteristics of the population and enterprises of the United States or other areas prescribed by law, and to publish and disseminate the resulting statistics for use by business, government agencies, and the public.

CEN also conducts special statistical studies on domestic and foreign trade, business services, industry, transportation, construction, agriculture, population, and housing, and on Federal, State, and local governments. Based on these statistical studies, the Bureau issues reports, special tabulations, and monographs.

CEN must provide data on the intake, use, and discharge of water by major users in the manufacturing and mineral industries sectors of the economy to government agencies and to the private sector. Water-use data are collected as a supplemental survey for the year following the quinquennial economic censuses. The economic censuses are taken for the years ending in 2 and 7; the water-use survey is taken for the years ending in 3 and 8. The last survey covered Calendar Year 1983. This survey includes establishments in the manufacturing and mineral industries that responded during the economic censuses that they consumed 20 million gallons of water or more during the calendar year. This panel of respondents is then mailed a questionnaire requesting detailed information on their sources of water, purpose of intake, discharge, treatment prior to discharge, recirculation efforts, and capital and operating expenditures related to these operations. Information is published by industry Standard Industrial Classification (SIC), as well as by State and U.S. Geological Survey water-resources regions. The data were collected in 1984 and are currently being processed with publication of the data scheduled for mid-1985.

As part of the census of agriculture, general information on irrigation is collected along with other required farm and ranch data. This includes information on total number of farms with irrigation, land area (harvested crop land and pasture) irrigated, and principal source of irrigation water. This information is available by State and county. Beginning in 1982, this census will be taken quinquennially at the same time as the economic censuses, for the years ending in 2 and 7.

In addition, CEN is also required to conduct a census of irrigation organizations (referred to as the census of irrigation) every 10 years; the last census was for 1978. In this census, data are collected on source and disposition of water, number and type of users served, the number of acres served, irrigation facilities operated, irrigation storage reservoirs, measurement of irrigation water, cost of operation and maintenance, new capital investment, indebtedness and revenues collected. These data are presented by State, Water-Resource regions, and subregions.

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A detailed farm and ranch irrigation survey was initiated for 1979. This survey, a 10 percent sample of all farms and ranches reporting some irrigation activity during 1978, was to supplement the basic irrigation information collected for the census year. Data collected included acres irrigated, yields of irrigated and nonirrigated crops, quantity of water used, method of water distribution, types of pumps, inventory and characteristics of irrigation wells, expenditures for pumping irrigation water, and expenditures for water obtained from off-farm suppliers.

Because funding was not available, the farm and ranch irrigation survey was not carried out following the 1982 Census of Agriculture. CEN is currently negotiating with the Economic Research Service (ERS) of the Department of Agriculture to conduct this survey during Fiscal Year (FY) 1985. If ERS accepts the program, the survey will be taken in early 1985 and cover Calendar Year 1984.

CEN also conducts an annual survey of capital expenditures and the operating cost by manufacturing for pollution abatement (air, water, and solid waste). The water-related information collected includes capital expenditures (end-of-line techniques and changes-in-production process), operating costs, water pollutants abated by weight, costs recovered through abatement activities, and payments to government units for use of public sewage. Data are by four digit industry SIC and for State and metropolitan statistical area by two digit industry SIC.

Future Data Needs and Plans (1987 and Beyond). An evaluation will be undertaken in FY 1986 to determine what additional requirements are needed to improve the statistical accuracy and establishment coverage, as well as a review of the question being asked. The next survey will take place in 1988.

An evaluation concerning the scope of the 1987 Census of Irrigation is also being carried out currently. Traditionally, the census irrigation has collected information from establishments that provide irrigation water to farms and ranches. Several users have suggested that the need for information concerning farm and ranch irrigation practices has increased while the need for irrigation establishment data has declined. Therefore, the legislative requirements are being reviewed to determine possibility for changes in the collection program.

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National Ocean Service (NOS)

Agency Data Needs--Base Program and Changes (1984-1986). NOS is responsible for operating a network of water-level stations in the Great Lakes to provide data for national and international use by Federal and local governments, various international treaty boards and committees, private interest groups, and the general public.

Under this mission responsibility, NOS collects or participates in the collection of hydrometeorological data elements such as lake levels, water-surface profiles of major connecting Great Lakes Channels, Great Lakes Basin precipitation, wind speed and direction, water temperature, barometric pressure, ice conditions, and stage-discharge relationships for canals and hydroelectric power generation. The methods required to accomplish these needs are both automatic and observer-oriented. At present, 40 percent of the permanent lake-level data is automated for real-time operation. The remainder of the collection network depends on contracted observers, who are still a key part of maintaining a 90 percent data-collection success rate.

The mainstay of the NOS Water Level Program is the operation of the base program consisting of 54 permanent and 123 seasonal gaging sites, located throughout the 295,000 square miles of the five major lakes, their connecting channels, and the St. Lawrence River, which are referenced to the International Great Lakes Datum (IGLD). This datum, and its maintenance and updating are also part of the base program. Currently, there are over 3,000 marks referenced to IGLD in the Great Lakes Basin and the information is available in the data-base file.

Because precipitation is the original source of all water in the Great Lakes, it is of vital concern in the monitoring and regulation of the system. Monthly data from 800 United States and Canadian stations are obtained, processed by computer, and forwarded to the Corps of Engineers for use in forecast and regulation applications.

Changes in Automatic Data Collection System equipment and upgrades in the computer processing system are now becoming a reality. These changes will result in improved quality-control monitoring and procedures, and improve the data base availability to all water-resources managers and the general public.

Field work for IGLD vertical maintenance has been completed. Publication and implementation of elevations is expected in 1986 provided the current funding is maintained.

Future Data Needs and Plans (1987 and Beyond). Basic future data needs are expected to be similar to current needs. The proposed new data-collection system with installation of initial field units in Fiscal Year 1986, will consist of primary features such as noncontract sensors, computer controlled data collection via data-collection platforms, data transmission via Geostationary Operational Environmental Satellites, optional telephone/short-range radio links in real time, and an integrated data processing and analysis

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system based on modern automated data processing hardware and software. The new systems are expected to provide results in facilitating field operations and maintenance, improve data quality and timeliness, and greatly reduce the current labor-intensive data handling. These planned systems are directed toward both the water-level data collection and the IGLD reference system for as many "push button" operational concepts as state-of-the-art science can achieve.

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National Weather Service (NWS)

Agency Data Needs--Base Program and Changes (1984-1986). NWS needs hydrometeorological and surface-water data for real-time operations and nonreal-time data-base purposes. The elements of primary need from designated networks are soil moisture, precipitation, river stage, snowfall, water equivalent of snow and ice on the ground, lake levels, streamflow, reservoir elevation and discharges, air temperature, wind velocity, evaporation, solar radiation, and surface-water temperature. Most of the hydrometeorological data are obtained from continuously operating in-house data-collection programs, while the majority of the required surface-water data is obtained from the data-collection programs of other agencies.

The NWS collects river-stage data from some 1,800 stations, and precipitation data from about 4,100 stations. An additional 1,100 stations report both river and precipitation information. The data from these approximately 7,000 stations are used to provide river and flood forecast services to over 3,000 communities. About 20 percent of the approximately 7,000 stations, from which the NWS collects data, are automated. Automation includes using telephone lines, VHF radio, and the Geostationary Operational Environmental Satellite (GOES) to meet operational data requirements for flood forecasting. These data are primarily rainfall and water-level observations. The streamgaging stations that have been automated (telemetered) are generally those of a cooperating agency to support its own data-collection requirement. An additional 1,700 reports are collected from other agency-automated data networks, mostly data acquired via the GOES satellite.

All NWS offices have Automation of Field Operations and Service (AFOS), a high-speed computer network connecting all NWS offices nationwide for storage, delivery, retrieval, and display of data, forecasts, and warnings. All NWS River Forecast Centers have "gateway" computers to complement their AFOS equipment. These computers and their associated software are being interfaced with those of other water-resources agencies for data and information exchange. They will also have the capability to collect data operationally from local and site-specific warning networks.

Future Data Needs and Plans (1987 and Beyond). Current planning calls for 2,000 additional automatic stations. Efforts will be concentrated on adding real-time reporting capability to a larger percentage of the manually reporting network. It is also planned to develop a national hydrometeorological data base to improve river and flood forecasting and extended streamflow prediction in general.

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DEPARTMENT OF DEFENSE

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U.S. Army Corps of Engineers (COE)

Agency Data Needs--Base Program and Changes (1984-1986). To accomplish its mission of effectively planning, designing, constructing, and operating optimum water-resource projects, and developing nonstructural water-resources plans for communities and river basins throughout the United States, the COE obtains water from many sources. Included is a large in-house water-data collection program plus other Federal, State, and private sources. Water data are obtained from other Federal agencies through transfer of funds; the Geological Survey and National Weather Service are the major participants. Congressional appropriations provide funding for water data in general investigations, research and development, construction and operation, and maintenance accounts. Although the total number of streamgaging stations available to the COE has remained relatively constant in recent years, the type of streamgage has been changing. In an attempt to meet real-time operational needs of water-control projects, the Corps has been converting many stations from the standard method of data transmission to satellite transmission using data-collection platforms (DCP) for effective real-time operation. For example, at the end of Fiscal Year (FY) 1977, the Corps has only 58 self-timed DCPs. By the end of FY 1981, however, the running total of Corps DCPs has increased to over 500, and by FY 1983 end, 1,100. The peak annual conversion to real-time operational mode is expected to occur during FY 1984 when almost 600 additional DCPs will be deployed. The rate of deployment is expected to decline in FY 1985 and following. The estimated number of Corps self-timed DCPs will approach 2,300 through 1987, and 3,300 through 1992.

As mentioned earlier, the total number of streamgages has stabilized. Tight budget constraints are producing closer scrutiny of the water-control management program. To offset the additional cost of becoming more involved in real-time operation, many other streamgages have been "downgraded" from a continuous recorder type to a partial record or crest stage indicator. In a few cases, gages have been discontinued.

Future Data Needs and Plans (1987 and Beyond). No significant changes or new thrusts are apparent at this time.

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DEPARTMENT OF ENERGY

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Federal Energy Regulatory Commission (FERC)

Agency Data Needs--Base Program and Changes (1984-1986). Under the Department of Energy Organization Act, FERC was created (effective October 1, 1977) as an independent agency within the Department of Energy. FERC assumed most of the functions of the former Federal Power Commission, which was abolished by the Act.

The mission of FERC as it relates to water resources is to license the development of hydroelectric power that is economically, socially, technically, and environmentally acceptable; to help ensure the comprehensive development of the Nation's water and related land resources through its hydroelectric licensing program; and to support and participate in comprehensive interagency, intergovernmental, and private planning efforts.

Principal among the Commission's responsibilities relating to water-resources development are licensing non-Federal hydroelectric projects and conducting river-basin planning studies, either in connection with licensing or in cooperation with other Federal agencies with respect to Federal river-basin management programs. Important related activities include the inspection of licensed hydroelectric projects to ensure dam safety and proper operation and maintenance of projects, the maintenance of an inventory of hydropower resources of the country, the investigation of headwater benefits, and the withdrawal from entry or sale of certain Federal lands having value as existing or potential hydropower sites.

To carry out its licensing responsibilities, FERC utilizes water data collected by USGS; other Federal, State, and local agencies; and its licensees. A standard condition in all hydroelectric licenses issued for major projects requires the licensee to install and maintain necessary streamgaging facilities under the supervision of the USGS. Also needed are data on oxygen and chemical content, sanitary conditions, and water temperatures. Funds for such supervision and cooperation by the USGS are advanced by the licensee. Additional data needed for FERC studies include data on the operation of existing reservoirs, historical streamflow data to evaluate potential hydropower sites and calculate benefits at operating powerplants, and evaporation and sedimentation rates.

Future Data Needs and Plans (1987 and Beyond). The unusually large number of applications for permits and licenses to construct hydroelectric projects is expected to continue for a few more years. The majority of them would be relatively small in scale or would be installed at existing dams. Many of these licenses will involve establishing minimum streamflows and implementing related monitoring programs to ensure compliance with the specific license requirements. In general, the FERC's water-data needs in 1986 and 1987 will continue to increase somewhat to accommodate the expanding small hydroelectric program.

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

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Office of Housing

Agency Data Needs--Base Program and Changes (1984-1986). The Office of Housing has departmental programs and functions for financing and managing housing, and preserving and rehabilitating the housing stock.

The Housing Program needs to include identification and quantification of surface- and ground-water quantity and quality and water-related problems such as potential flood levels; land movements due to erosion, slides and subsidence; and pollution. Data are normally obtained from a variety of sources including the Environmental Protection Agency (EPA), Geological Survey, Soil Conservation Service, State and local health departments, State agencies, local governments, and site-specific engineering studies.

Future Data Needs and Plans (1987 and Beyond). For developing areas of the Nation, we will need information to assure that dwelling occupants will have an acceptable and safe water supply for all household uses, and that occupants and dwellings will be reasonably protected against hazards.

Ground-water quantity and quality data are needed. Water quality should be reported at least in terms of EPA drinking-water standards.

Flooding hazards and exposure frequency are needed for all urban and suburban waterways not currently addressed by the National Flood Insurance Program.

Potential land movements caused by erosion, slides, and subsidence need to be identified and quantified. Locational risk factors are needed.

Surface-water and ground-water pollution problems caused by liquid and/or solid-waste disposal will need to be evaluated, particularly for hazardous-waste disposal sites identified by EPA and exemplified by the Love Canal in the Buffalo, New York, area.

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Office of Community Planning and Development

Urban Development Action Grants (UDAG)

Agency Data Needs--Base Program and Changes (1984-1986). The UDAG program provides discretionary grants to cities that meet certain statistical distress criteria, demonstrate results in providing equal opportunity in employment and housing, and meet competitive selection criteria including job formation and private investment. Action Grants may be used for a wide range of activities, including 100 percent of the cost of the acquisition, construction, reconstruction or installation of water facilities including source development, impoundment, treatment, transmission, storage, and distribution.

The program need for water data is a responsibility of the grant recipient, and data are normally obtained from other Federal agencies (the Corps of Engineers, Geological Survey, Soil Conservation Service, Bureau of Reclamation, and other agencies), State agencies, and private consultants.

Future Data Needs and Plans (1987 and Beyond). No significant changes or new thrusts are apparent at this time.

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Community Development Block Grants (CDBG)

Agency Data Needs--Base Program and Changes (1984-1986). Under the Block Grant Program, cities may undertake a wide range of activities directed toward neighborhood revitalization, economic development, and improved community facilities and services. The Block Grant Program provides local governments with grants for activities such as the acquisition, construction, reconstruction or installation of public facilities, and improvements such as water facilities, which may include source development, impoundment, treatment, transmission, storage, and distribution. Localities entitled to annual grants include central cities of Standard Metropolitan Statistical Areas (SMSAs), other cities in SMSAs with populations of 50,000 or more, and counties in SMSAs with populations of 200,000 (excluding entitled cities). Grant amounts are determined by a statutory dual formula, which includes either population, poverty, and overcrowded housing or population growth lag and age of housing. Nonentitled localities compete for funds allocated by State under a similar formula. The competitive grants are allocated and administered either by a State or by the Department of Housing and Urban Development, at the option of each State. Cities under 50,000 must compete for funds identified for use by "small cities." All activities must meet the national objectives for program benefit. Under the CDBG Program, responsibility for compliance with the National Environmental Policy Act is delegated to the grant recipient.

The program need for water data is a responsibility of the grant recipient, and data are normally obtained from other Federal agencies (the Corps of Engineers, Geological Survey, Soil Conservation Service, Bureau of Reclamation, and other agencies), State agencies, and private consultants.

Future Data Needs and Plans (1987 and Beyond). No significant changes or new thrusts are apparent at this time.

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DEPARTMENT OF THE INTERIOR

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Bureau of Indian Affairs (BIA)

Agency Data Needs--Base Program and Changes (1984-1986). To develop the water resources on approximately 52 million acres of Indian lands and 500,000 acres of federally-owned lands for such purposes as irrigation, range, hydropower, municipal and industrial use, flood control, fish and wildlife enhancement and recreational water needs, while preserving the physical, chemical, and biological content of these resources. In addition, the Bureau uses its technical expertise to assist Indian tribes in establishing and protecting rights to sufficient quantities of water to maintain an acceptable standard of living in support of the concept of the needs for permanent tribal homelands.

The Bureau needs a variety of water data to accomplish its multifaceted mission. Examples include: (1) Ground-water quantity data to be used in the control of ground-water withdrawals to support water-rights litigation, and to prevent water mining (permanent aquifer damage), land subsidence, and the intrusion of salt water, or other polluted or degraded waters. (2) Ground- and surface-water data needed to assist agricultural engineers to identify sources of pollution and to prevent gradual degradation of quality. (3) Surface-water quantity data to assist in flood-plain mapping and development of zoning ordinances, to determine allocations to irrigation subsystems, to assure adequate design of hydraulic structures (such as bridges, culverts, and dams), and to support water-rights litigation. Some of this data is gathered in-house as needs are identified at specific sites. The data resources of other Federal and State activities, most frequently the USGS, are also used, as are those of private contractors.

The number of Bureau activities that support upcoming water-rights litigation varies from year to year. The Bureau is currently pursuing a program of water-resources inventories in order to provide for the orderly development and optimum use of these valuable resources with minimum impact on the environment. This program, which was initiated in 1971, currently has 200 studies complete or near completion. An additional 320 studies are yet to be initiated. The funding level for the water-resources inventories of studies in support of litigation was approximately 5.5 million in Fiscal Year 1983.

The major plans for the next 2 years will include continued emphasis on Indian water rights and development. Implementation of the ongoing 10-year water plan provides data for negotiation or litigation to resolve Indian water rights, as well as for development. Concurrently, there is an increased emphasis on water-data communication and coordination with other Federal and State activities.

Future Data Needs and Plans (1987 and Beyond). During the next few decades, the competition for water in the Western United States is expected to increase drastically. Conflicts between competing interests for the development of water, minerals, energy materials, and other resources will intensify efforts to conserve, protect, and optimize the use of water. Therefore, the needs of water data to support these efforts will persist accordingly.

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Bureau of Land Management (BLM)

Agency Data Needs--Base Program and Changes (1984-1986). Overall mission of the Bureau is to manage the public lands and their resources within its jurisdiction on the basis of multiple-use and sustained yield. To accomplish the mission, the Bureau must provide for the management, conservation, and protection of the water resources on approximately 327 million acres of public lands administered by the Bureau. This requires the preparation and maintenance of a water-resources inventory of all the public lands, as well as analysis and evaluation of the occurrence, quality, and quantity of all surface- and ground-water resources on and under the public lands.

The Bureau needs water quality and quantity data in the preparation of land-use planning and management documents, mineral developments, environmental assessments, the quantification of water uses and needs for the protection and adjudication of Federal and State appropriative water-rights claims, and technical and scientific support of all Bureau programs.

The Bureau is authorized to prepare and maintain a water-resources inventory by the Federal Land Policy and Management Act of 1976. Data-collection activities include the establishment of streamgaging stations to monitor water quantity and quality of major rivers, as well as site-specific measurements of small water resources such as springs. Data collection and lab analyses of water samples are done in-house, by the USGS, State agencies, universities, and private laboratories. Inventories provide the basic information necessary to determine water availability for Bureau programs and potential water impacts from activities such as energy and mineral development. Other water data are collected by the Bureau's erosion control studies, floodplain appraisals, hazardous-waste site investigations, snow surveys, and reservoir evaluations.

Future Data Needs and Plans (1987 and Beyond). No significant changes or thrusts are anticipated, except possible increase in water-quality data collection related to hazardous-materials management and potential nonpoint pollution and salinity control activities.

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Bureau of Mines (BOM)

Agency Data Needs--Base Program and Changes (1984-1986). The BOM requires water-use information for mineral resource development and general hydrologic information for consideration of the impact of mining on the surface- and ground-water systems. These needs are met largely through data developed on site-specific research projects under the Bureau's environmental research program, and with data developed by other agencies.

Future Data Needs and Plans (1987 and Beyond). Unless the present funding trend reverses, the Bureau's water-data program will further diminish.

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Bureau of Reclamation (BOR)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of BOR is to develop, manage, and conserve our limited water and related land resources to meet the present and future requirements of the West. BOR is involved in the multipurpose development and conservation of the water resources of the 17 Western States. Project purposes include irrigation, hydropower, municipal and industrial supply, and enhancement of water quality.

BOR needs water data for planning (including environmental analysis), designing, constructing, and operating water-resources developments. These needs are presently being met by the U.S. Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), Soil Conservation Service (SCS), States, universities, and the private sector, as well as by in-house data-collection programs. BOR presently transfers funds to the USGS by means of a cooperative-type program for their services. In addition, contracts are negotiated with States, universities, and private organizations for their services. NOAA and SCS receive direct appropriations from Congress for their data-collection programs.

No significant changes or new directions in water-data programs are expected, except for a need for real-time data to improve forecasting procedures for floods.

a. Data collection for operating projects is quite stable.

b. Data collection for planning programs fluctuates with the budget.

c. Data collection for research is not large enough to be significant.

Additional budget cuts would, of course, affect the data-collection program.

Future Data Needs and Plans (1987 and Beyond). Improvements in forecasting the runoff from some of the major drainage basins, such as the Colorado River, are expected. The added costs for such improvements could be charged to flood control and power, which would benefit most from more accurate runoff forecasts. In such cases some lesser proportion of the increased benefits would occur to ongoing irrigation activities or long-range planning for new projects.

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Fish and Wildlife Service (FWS)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of FWS is to provide the Federal leadership to conserve, protect, and enhance fish and wildlife and their habitat for the benefit of all people. The Service provides ecological expertise to all aspects of water-resources planning, development, and management.

Habitat destruction is the greatest threat to fish and wildlife resources in the United States. Thus, the Service must maintain a high level of expertise on the various components of natural habitat, especially water-related components.

The Service depends on the numerous Federal and non-Federal agencies that produce basic water data. The data are used as fundamental input to many research, management, and consultation activities and are used to directly substantiate Service water rights. For example, water-quality data are used in determining the effects of various pollutants on fish and wildlife, and flow data are used to establish instream flow requirements to maintain a viable fish habitat. Streamflow records maintained by the U.S. Geological Survey (USGS) and water-quality data published by the Environmental Protection Agency (EPA) and various State agencies must be consistently available so that the Fish and Wildlife Service (FWS) can forecast the potential effects of proposed water-resources development projects and waste-discharge proposals.

The Service's requirements for water information, principally basic data usable in developing ecological impact material and in appropriating, adjudicating, and protecting Service water rights, are largely being met. One major deficiency is representative stream cross-section data in areas where flow gaging stations are maintained. Another deficiency is data on ground-water movement and on the relationship of ground water to surface water, especially in important wetland areas.

The FWS collects water data only when needed information is not available from other sources. Current data-collection activities include: wetland classification and mapping; streamflow requirements for maintaining fish populations for use in the Instream Flow Incremental Methodology; factors affecting the habitat value of fish in aquatic areas for use in the Habitat Evaluation Procedures; national survey (cooperatively with EPA) of fishing status in the United States as input to EPA's national monitoring strategy; biological aspects of smal scale hydrodevelopment; characterization of the attributes, values and vulnerability of various wetland types; dynamics of forest wetlands subject to periodic inundation; effects of channelization on different types of fish and wildlife habitat; maintaining gaging and water-level stations on some refuges; periodically testing water quality at refuges and hatcheries; and fishery research on water-related problems.

For 1985 and 1986, increased budgets will be requested for wetland inventory and mapping activities. FWS is working cooperatively with USGS to provide National Wetland Inventory Maps to the general public.

Future Data Needs and Plans (1987 and Beyond). For the long term, approximately the same budgetary resources are envisioned for these activities as are currently available, and no significant revisions in the program are anticipated.

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National Park Service (NPS)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of the NPS relating to water data is to preserve and protect the water resources and water-dependent environment of Park System areas; to provide potable water-supply sources to meet visitor and employee water demands; to assist in the maintenance of water-supply quantity and quality; and to establish, protect, and perfect Federal rights to water in all Park System areas.

To accomplish its mission the NPS conducts hydrologic studies to inventory known water sources--streams, lakes, springs, wells--and their present use and development, physical characteristics, and potentials. Paralleling the importance of knowledge of the physical characteristics of the water resource is a knowledge of the ownership and legal limits to which this resource may be utilized. To this end, NPS directs activities to investigate ownership, rights, and use of water for all park areas to facilitate the protection and, where appropriate, the perfection of water rights. Water-resources activities involve collecting water-resources and water-rights data for general development plans, natural-resources management proposals and plans, and wilderness studies; developing and maintaining water-supply and sewage-disposal systems or methods; establishing water-quality standards and criteria; formulating water-quality management plans; conducting boundary studies; determining effects on park areas of developments on park water resources and related environments; preparing and/or assessing environmental impact statements; and maintaining, enhancing, or restoring water quality.

The water-resources/water-rights studies are generally conducted under inter-bureau agreements with other Federal agencies, principally the U.S. Geological Survey, or by contract with State agencies, universities, or private consultants. A limited number of studies are made by Service personnel.

The 1984 base program includes: (1) continuation of surface- and ground-water monitoring programs; (2) location of new or supplemental water sources for existing or proposed water systems to satisfy water demands at Park System areas; (3) delineation of floodplains and related flood hazards and development of water-resources management plans for Park System areas; and (4) continuation of a riparian ecosystems research program.

Principal program changes for 1985-1986 will include the following: acceleration of the riparian ecosystems research program to establish correlation between stream quality/quantity with ecosystem viability; research on water-dependent threats to Park System resources; continuation of program emphasis on the development and implementation of water-quality management plans and the establishment of water-quality standards and criteria for designated instream uses in Park System areas; increased emphasis on monitoring programs to assess impacts on Park System area water quantity and quality from ongoing or proposed energy or other industrial developments; establishment of monitoring programs to determine effects of acid rain on Park System area resources; the quantification of current and future consumptive and nonconsumptive water uses for System areas as part of the Service's general management planning process; and increased emphasis on the delineation of floodplains and related flood hazards.

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Future Data Needs and Plans (1987 and Beyond). Future program plans will involve an accelerated effort to adequately document known or suspected threats, as reported to Congress in the 1980 "State of the Parks" report, to Park System area water resources. Program emphasis will be on addressing identified categories of threats, including: inorganic and organic chemicals, salt/sediment deposition, unnatural flooding or flow decrease, thermal discharge, toxic chemicals, geothermal development, OCS/oil spills, acid deposition, and radioactivity. Planning and resource allocations will focus on potential and long-term threats, concentrating on appropriate "significant resource problems" and energy-related resource developments which affect water or riparian values of Park System areas. The Alaska Lands Act of 1980 established 11 new Park System areas totaling 31 million acres. The new Alaskan areas require significant assistance in water-quality monitoring, comprehensive baseline studies, inventories of aquatic and riparian resources, flood-hazard delineations, and early location of ground-water sources to ensure potable water supplies. Minerals and other energy-development activities within and adjacent to several Alaskan parks further pressure the natural resources.

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Office of Surface Mining (OSM)

Agency Data Needs--Base Program and Changes (1984-1986). The enabling legislation of OSM (Public Law 95-87) contains provisions to allow for research and demonstration projects for coal development; to develop programs to reclaim abandoned mine lands; to develop data and assessment procedures to protect the hydrologic balance; and to collect hydrologic data for assisting small operators. All of these activities will directly or indirectly relate to water-resources information and will be met through interagency agreements, contracts, and grants. However, close coordination is needed between Federal and State agencies and the private sector on data consistency, analysis and interpretation, and technology transfer to assure cost effectiveness and reliability relative to data-acquisition activities.

OSM will embark on various water-resources related activities, which will affect water-data acquisition and coordination. Existing systems will be used to coordinate storage and retrieval of data with the U.S. Geological Survey (USGS), the Environmental Protection Agency, and State water agencies in an effort to coordinate dissemination of data to coal operators via State regulatory authorities. Also, OSM is cooperating with the USGS, States, coal operators and consultants to develop guidance for preparing cumulative hydrologic impact assessments, for determining probable hydrologic consequences, and for implementing alternative sediment control methodologies.

In addition, an OSM program is available to assist small operators in collecting and analyzing certain hydrologic and geologic information. This will be coordinated through Federal and State agencies and contracted with qualified laboratories. Guidance materials and procedures will also be developed to assist all operators on water-data collection and interpretation for permits and monitoring.

The critical data needs continue to be site-specific quantity and quality information for surface and ground water in small upland watersheds less than 50 square miles. At present, streamflow and water-quality data are available only for major or some secondary streams. Considerably more ground-water data are needed. This is especially important for the Eastern steep-slope coal fields where the greatest number of operators exist. For permitting purposes, operators need baseline data (prior to mining), which includes the delineation of areas where coal or overburden contains acid forming or other toxic materials, and the interpretations of the extent of their impact on ground- and surface-water quality in these areas. Coupled with this is the need for a highly efficient system of determining the adequacy of existing data, recommending data needs, assessing data, and transferring this information to State regulatory authorities to determine additional data requirements for operators to meet permit requirements. This will be a continuing process because the intent is to continually improve the data base and transfer technology capabilities so that, with time, the cost of data collection per watershed area will be reduced and greater emphasis will be placed on transferring existing data. This effort will also require coordinating data-collection efforts and providing data to agencies actively involved with reviewing permits and/or developing nonpoint-source models so that models will be improved for technology-transfer processes.

Future Data Needs and Plans (1987 and Beyond). No changes are expected.

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U.S. Geological Survey (USGS)

Agency Data Needs--Base Program and Changes (1984-1986). The USGS was established to conduct, on a continuing, systematic, and scientific basis, the investigation of the "geological structure, mineral resources, and products of the national domain." These activities are administered through three major program Divisions: National Mapping, Geologic, and Water Resources (WRD). The mission of WRD, which supports the overall mission of the Department of the Interior (DOI) and the Geological Survey, is to provide the hydrologic information and understanding needed for the best use and management of the Nation's water resources for the benefit of the people of the United States.

To accomplish its mission, the WRD, in cooperation with State and local governments and other Federal agencies, conducts surveys, investigations, and research on the occurrence, quality, quantity, distribution, utilization, movement, and availability of the Nation's surface- and ground-water resources. An essential part of this activity is the systematic, nationwide program of data collection, analysis, and dissemination. As the principal Federal water-resources fact-finding agency, WRD provides information and technical assistance to officials at all levels of government who are responsible for planning, design, and management decisions related to the hydrologic environment. The functions described above are supported by Federal appropriations, reimbursements from other Federal agencies, and by the Federal/State Cooperative Program (50:50 matching).

Thus, by far, the greatest part of the USGS's requirements for water information are met by in-house programs; the principal needs are to fulfill mission goals for furnishing hydrologic data and producing related analyses, interpretations, and research findings for the use of all agencies and citizens of the United States.

In addition, the USGS National Mapping Division is involved with various aspects of water programs. Of principal interest in this regard is cartographic support such as compilation and digitization of water data. Examples include boundaries of hydrographic basins and watersheds, point data, location of water-gaging stations, hydrographic features, wetlands, and irrigated croplands.

The USGS maintains a nationwide system of streamgaging stations, ground-water observation wells, and water-quality sampling sites. The Survey's water-data program provides the hydrologic data for water-resources appraisals, environmental-impact assessments, and energy-related studies and, in establishing the baseline conditions of the Nation's water, forms an invaluable foundation for solving emerging issues. These issues include identification and analysis of potential problems related to movement and storage of toxic wastes, acid precipitation, organic contamination in surface and ground water, oil-shale hydrology, food and fiber production, land-use changes, and hydrologic hazards.

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The outlook for USGS water-data programs in Fiscal Year (FY) 1985 is not completely clear at this time. The most informed estimates at this time indicate that the budget for FY 1985 will likely be about the same as that for FY 1984.[1] One significant change is that the coal hydrology activities in the Federal program would be eliminated except for $1.0 million, which would be redirected to the Federal-State Cooperative Program for related work. In addition, support has not been included in the USGS budget for the Water Resources Research Institutes.

Additional changes in FY 1985 may take place and could affect the programs mentioned above, as well as others. Because of the present uncertainties with respect to FY 1985, it is likewise most difficult to project budgets for FY 1986 with any strong degree of confidence. However, the DOI has approved submission of the USGS estimates to the Office of Management and Budget showing a level of about $138 million for water-resources investigations. This would include increases for Data Collection and Analysis, Toxic Substances Hydrology, and the Federal-State Cooperative Program. It also provides for funds to support activities under the Water Resources Research Act.

Future Data Needs and Plans (1987 and Beyond). It is anticipated that requirements for hydrologic information will continue to increase. The principal emphasis is expected to be on water quality, toxic-waste hydrology, and water supply and demand.

[1] As of September 1984

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DEPARTMENT OF TRANSPORTATION

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Federal Highway Administration (FHWA)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of the FHWA is to promote the general welfare, the economic growth and stability of the Nation, and its security through the development of national transportation policies and programs conducive to the provision of fast, safe, efficient, and convenient transportation consistent with utilization and conservation of the Nation's resources.

To support the design of fast, safe, efficient, and economical transportation facilities, a network of streamgaging stations is necessary to estimate design flows for sizing hydraulic structures. The network is operated by other agencies, primarily the U.S. Geological Survey (USGS).

It is also necessary to establish a water-quality data base so that the effects of transportation construction, maintenance, and operation on the water quality of the Nation's streams can be evaluated and mitigated. Primarily, data collected by other Federal and State agencies is utilized.

The Department of Transportation participates in the National Small Rural Watershed Program with several States and USGS. This program contributes to improved procedures for estimating flood flows and the effect of urbanization on flood flows at highway stream crossings.

The Department is also involved in the collection of water-quality data for research and project monitoring. These data are being utilized to define the constituents, migration, and impacts of pollutants in transportation-related runoff, and to improve mitigation measures employed during construction and operation of transportation facilities.

Future Data Needs and Plans (1987 and Beyond). The need for more complete flood-flow information will remain as high, but the need for collecting flood-flow data will moderate with the emphasis shifting toward methods of extracting increased information and the design of more effective data-collection networks. There will be a decreasing need for the collection of water-quality data to define the effects of transportation facilities on the environment as highway agencies develop and gain confidence in predictive procedures and models to assess such impacts.

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INDEPENDENT AGENCIES

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Council on Environmental Quality (CEQ)

Agency Data Needs--Base Program and Changes (1984-1986). The mission of CEQ is to advise the President, the Congress, Federal agencies, and the public regarding conditions and trends in the quality of the environment; to review and appraise Federal environmental programs and policies; to review the adequacy of systems for monitoring and predicting environmental changes; and to collect, collate, analyze, and interpret data and information on environmental quality.

CEQ requires many types of water data for national policy studies and program evaluations. Data used are typically from the U.S. Geological Survey National Stream-Quality Accounting Network (NASQAN), from the Environmental Protection Agency, from State monitoring programs, from international sources, and from special studies by agencies. CEQ frequently requires data that are compatible for multimedia analysis covering pollution effects, human health, air quality, land use, and economic and industrial features.

CEQ was provided $175,000 from funds previously appropriated, to be expended in Fiscal Years (FY) 1984 and 1985, to strengthen the technical and scientific expertise of the Council. During FY 1985, these funds will be used to improve data collection on environmental-quality changes, to inventory Federal programs for environmental monitoring, to begin the process of resolving problems associated with environmental monitoring, and to obtain information about the environment for the CEQ annual report.

The Chemical Substances Information Network (CSIN) is administered by CEQ. Funding for CSIN operation, maintenance, and support is provided by several Federal programs through interagency agreements with CEQ. The development and deployment of the demonstration project is nearing completion. The CSIN technology will continue to be used to serve Federal agencies but will no longer be administered by CEQ after FY 1985.

The National Acid Precipitation Assessment Program is charged with developing and improving an objective and comprehensive information base. Established in 1980, it was given a 10-year renewable mandate with annual reporting duties. Its budget, obtained from several agencies, has increased from $18 million in FY 1982 to $27 million in FY 1984.

Future Data Needs and Plans (1987 and Beyond). No significant changes or thrusts are anticipated. CEQ expects to continue publishing its annual report, managing the Acid Precipitation Program, and working toward the improvement of environmental-monitoring activities.

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Environmental Protection Agency (EPA)

Agency Data Needs--Base Program and Changes (1984-1986). EPA's mission with respect to water quality is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Within the framework of this mission, EPA is responsible for conducting related research and demonstration projects; establishing and enforcing water-quality standards; monitoring water quality; and defining technology-based and water-quality based pollution controls while, at the same time, progressing toward a greater understanding of the environment as a single system of interrelated parts.

Water-quality data are needed to support a large number of EPA, State, and local problem assessment and pollution-abatement programs. Physical, chemical, and biological measurements of water are needed to assess degrees of pollution, the sources of pollution, the effect of the pollutants on the waterways, and the effectiveness of Federal or State pollution-abatement programs. The data are analyzed and used to assess the Nation's water quality. These assessments include the biennial Water-Quality Inventory Report based on the State submissions under Section 305(b) of the Clean Water Act and other specialized water-quality analyses that summarize EPA and other water-quality data.

As reflected in the EPA's Office of Water Regulations and Standards "Monitoring Strategy for Inland and Coastal Waters", water monitoring has six major areas of emphasis: (1) Regulatory Monitoring; (2) National and Regional Assessment; (3) Program Evaluation Monitoring; (4) Clean Water Act Implementation Oversight; (5) Data Quality Improvement and Control; and (6) Integrated Data Management for Improved Decisionmaking.

Included above, under "Program Evaluation Monitoring," is the "National Dioxin Study" being addressed in Fiscal Years (FY) 1984 and 1985. This study involves extensive statistical design efforts and a broad range of monitoring ranging from soil, sediment, and water through fish tissue. Significant new activities will be directed toward protection of ground-water quality. An Office of Ground-Water Protection was established in FY 1984.

Future Data Needs and Plans (1987 and Beyond). Other program evaluation studies such as the Dioxin study, which will generate new data needs and involve extension and development of new methodologies, are anticipated. Emphasis will continue in the area of toxic pollutants, in general, with concurrent need for expansion in bioassay and biomonitoring techniques. Ground-water protection will continue as an issue for major emphasis.

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Federal Emergency Management Agency (FEMA)

Agency Data Needs--Base Program and Changes (1984-1986). FEMA is the central point of contact in the Federal Government for a wide range of emergency management activities in both peace and war. Many of FEMA's emergency management activities involve water resources. FEMA's responsibilities include all national emergency preparedness, mitigation (for example, National Flood Insurance Program [NFIP]) and disaster response programs, the coordination of Federal aid for Presidentially declared disasters (for example, floods) and emergencies, and practical application of research to lessen damaging effects of emergencies and disasters.

FEMA uses water data in three major areas: NFIP, "Superfund" responsibilities, and disaster programs.

As one of the Agency's primary hazard-mitigation programs, the NFIP has an ongoing need for hydrologic data nationwide, which are provided principally by the U.S. Geological Survey (USGS). Presently, there are approximately 17,500 communities in the program and 2 million flood insurance policies. As more of these communities join the regular phase of the NFIP and enforce more strict floodplain management measures, and as individuals pay actuarial rates for insurance, better data from extended years of record, improved flood-frequency analysis, and improved methodologies are necessary to delineate flood hazards more accurately.

As a result of the "Superfund" legislation (and Executive Order 12316), FEMA is responsible for coordinating emergency response to hazardous-material spills and hazardous-waste site emergencies. For coastal emergencies the Coast Guard generates water data; for hazardous-waste sites, the Environmental Protection Agency provides the technical data (ground-water quality and the like) on which FEMA would base its actions. Data are both in real-time and nonreal-time.

The Agency's continuing role in disaster response and recovery mandates constant monitoring of real-time hazards, a majority of which are flood related. Regular contacts with the USGS Water Resources Division, the National Weather Service, and the U.S. Army Corps of Engineers provide information for disaster preparedness and response.

Future Data Needs and Plans (1987 and Beyond). No significant changes or new thrusts are apparent at this time.

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U.S. Section; International Boundary and Water Commission (IBWC)

Agency Data Needs--Base Program and Changes (1984-1986). The Commission is responsible for executing the provisions of existing treaties and other agreements between the United States and Mexico relating to boundary water matters. The treaties and agreements provide for: (1) the distribution of the waters of the Rio Grande and Colorado River between the two countries; (2) the regulation and conservation of the waters of the Rio Grande by international diversion dams and storage dams and reservoirs so that the two countries obtain optimum utilization of their water allotments; (3) the protection by levees and floodways of lands along the river from floods; (4) the maintenance of the Rio Grande and Colorado River as the international boundary; (5) the preferential attention to the solution of border sanitation problems; and (6) maintenance of the international land boundary monuments.

To accomplish its mission, the IBWC collects water data, which include precipitation, streamflow, ground-water, and water-quality information, along the international boundary. Assistance is provided by State and Federal agencies in both countries.

Personnel in eight United States field offices along the Mexican border are continuing to collect data required by the treaties, with an increasing importance on water-quality data relative to sanitary contamination.

The collection of basic hydrologic data is expected to remain at the same level with increasing efforts to delineate and resolve specific border sanitation problems.

Future Data Needs and Plans (1987 and Beyond). It is expected that data on ground-water resources and water quality will continue to be needed in the coming years, as well as data on unapportioned waters of streams crossing the international boundary.

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Nuclear Regulatory Commission (NRC)

Agency Data Needs--Base Program and Changes (1984-1986). NRC was established by Congress under the Energy Reorganization Act of 1974. The primary goal of NRC in licensing and regulating nuclear reactors is to assure the health and safety of the public and to protect the environment. Similarly, NRC has the charge of insuring safe, permanent disposal of radioactive wastes by licensing nuclear activities and facilities, and by protecting the public against the hazards of low-level radioactive emissions and releases from the licensed nuclear activities and facilities.

To accomplish its mission, NRC requires that an applicant for a construction permit and an operating license for a nuclear facility provide a variety of data about the surrounding surface water and ground water. This entails determining probable maximum hydrologic events that may potentially affect the safety-related facilities and the site (e.g., hurricanes, river floods, low river flows, dam failures, precipitation, droughts, tsunamis, etc.), assuring an adequate safety-related water supply, and analyzing environmental effects caused by construction and operation of these facilities.

The Atomic Energy Act of 1954 was amended to limit the discharge of radioactive liquid effluents into ground and surface waters and to protect nuclear facilities from flooding. The Uranium Mill Tailings Radiation Control Act of 1978 was also amended to limit the discharge of radioactive effluents into ground and surface waters. Although much of the water data submitted to NRC is from previously published sources, some is collected by applicant licensee monitoring programs. These monitoring programs are reviewed by NRC staff with occasional confirmatory sampling by NRC regional inspection personnel. The periods of record and parameters monitored are site-specific and involve both safety and environmental concerns.

The NRC base program for water-data acquisition addresses the overall licensing programs and NRC organizational goals. The NRC program does not involve direct field data collection; rather, it involves review and analysis of data provided by licensees, contractors, and other government agencies. In order to understand and adequately review hydrologic issues, the NRC has either funded or collaborated with other Federal agencies in funding technical assistance and research contracts. The NRC staff effort involves monitoring the work being performed under contractual agreements with private consultants, national laboratories, universities, and other government agencies.

The NRC short-term program plans support licensing activities. The principal topics addressed in both staff analyses and contractor assistance work are liquid pathway analyses for ground-water contamination due to severe accidents, permanent dewatering systems at nuclear power plant sites, hydrodynamic measurements, analysis of flood hazards, and hurricane surge monitoring. Research on mitigative techniques and analysis of generic site conditions for ground-water contamination associated with severe accidents has been funded. In high-level waste management, research projects dealing with ground-water transport of

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radionuclides in porous and fractured rock, unsaturated flow and transport in fractured rock and hydrogeologic site characterization techniques are being funded. Specific projects for site characterization techniques are ground-water dating, geochemical laboratory and field studies, in-situ geologic and hydrologic measurement verification, and unsaturated zone instrumentation and analysis techniques.

In low-level waste management, studies are concerned with ground-water flow and solute transport in the unsaturated zone and related site monitoring techniques in near surface, unconsolidated materials. Stochastic analysis of solute tranport in unsaturated soils, site characterization techniques, verification studies at specific low-level waste facilities, quality control of water-data measurements and studies of chemical speciation and mobility are being conducted.

In reactor siting, the greatest use of water data will be in analysis of water data independently collected by the licensees at commercial reactor sites. These analyses also utilize water data previously collected by the U.S. Geological Survey and the Corps of Engineers.

Studies of uranium milling and mining facilities, including Uranium Mill Tailings Remedial Action Programs sites, are concerned with methods to minimize ground-water contamination from uranium recovery operations. Model evaluation of seepage from uranium tailing disposal above and below the water table and aquifer restoration at in-situ leach uranium mines involve ground-water flow and transport studies.

Future Data Needs and Plans (1986 and Beyond). The NRC long-term programs dealing with water data and water-data acquisition will evolve to keep pace with the needs of the nuclear industry. In the area of high-level waste management, work will concentrate on environmental and safety assessments including modeling studies for high-level waste repository sites. Similarily, low-level waste management work will center on shallow land-burial site assessment closure procedures to control and minimize infiltration and the assessment of alternative disposal techniques. A field validation study of stochastic hydrogeologic methods is planned for shallow land burial applications.

The principle effort to be addressed by the NRC staff with contractor assistance is the compilation of site-specific hydrologic data for evaluating commercial reactor sites. This data file will assist in both evaluating the potential impact of a hydrologic event on the safe operation of a reactor and analyzing the consequences of an accidental release of radionuclides into ground and surface waters. Work on stochastic methods for assessing the probabilities of severe hydrologic events at nuclear reactor sites will also begin.

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Tennessee Valley Authority (TVA)

Agency Data Needs--Base Program and Changes (1984-1986). TVA was created in 1933 as a regional resource development agency. Development and management of the water resources of the Tennessee Valley for the overall benefit of the people is a major responsibility. Protection and enhancement of environmental quality is an integral part of the development program. TVA operates a system of dams and reservoirs on the Tennessee River and its tributaries to provide flood control, navigation, and hydroelectric power, in addition to water supply and recreation uses. TVA collects hydrologic and water-quality data for its own needs and to help ensure wise uses of resources. The data is disseminated to others in a variety of ways.

TVA's water-data needs include information required for operations of the reservoir system and basic information on water resources of the Valley--precipitation and quantity and quality of surface and ground water. Data are collected in-house and through cooperative agreements, principally with the U.S. Geological Survey and the National Weather Service. Water-quality monitoring activities are coordinated with State agencies as well.

The hydrologic reporting network for precipitation and streamflow data is operated principally for reservoir operations planning. It presently consists of 250 precipitation gages, 127 of which are automatic, and 32 streamgages, 6 of which presently are automatic. Last year, 6 Geostationary Operational Environmental Satellites data-collection platforms became operational as part of TVA's dam safety program for Blue Ridge Dam in northern Georgia. The receiving station is in Knoxville. An additional 94 VHF radio gages were tied into the automated system last fiscal year. Data from the reporting network are received by a central computer in Knoxville and are automatically processed. After validation, the data are stored on magnetic tape. Weekly summaries are automatically produced for distribution. Because of the unavailability of funds, 24 precipitation gages continue to be manually observed.

TVA will continue activities in mapping of flood-prone areas under funding from the Federal Emergency Management Agency.

Future Data Needs and Plans (1986 and Beyond). In the long term, TVA's water-resources programs will place new emphasis on monitoring, the development of a comprehensive water-resources information base, and demonstrations of practical approaches to preventing degradation of the water resources.

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APPENDIX C

COORDINATION GUIDELINES
FOR
OFFICE OF MANAGEMENT AND BUDGET
CIRCULAR A-67

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Coordination Guidelines for The Office of Management Budget Circular A-67

The Interagency Advisory Committee on Water Data (IACWD) and the Advisory Committee on Water Data for Public Use (ACWDPU) have recommended to the Office of Water Data Coordination (OWDC) that the Office of Management and Budget (OMB) Circular, "Coordination of Federal Activities in the Acquisition of Certain Water Data" (numbered A-67 and issued August 28, 1964), remain substantially in force. OWDC is a special unit of the U.S. Geological Survey (USGS), which has principal responsibility for fulfilling the requirements of A-67. USGS agrees with the recommendation.

Several factors affecting the water-data coordination program have changed since Circular A-67 was originally promulgated, and six new guidelines are needed to (1) clarify selected issues in the Circular and (2) establish new policy to improve implementation of Circular A-67. These factors include new and amended changes in environmental and water legislation, new technology, revisions to programs of Federal agencies, and changing requirements for hydrologic data. The new guidelines are as follows:

1. The overall purpose of OMB Circular A-67 is to ensure the coordination of activities to collect, process, store, and disseminate hydrologic data, whether these activities are done in conjunction with the operation of networks and monitoring stations, or as part of hydrologic studies.

2. With respect to the national water data network, OWDC's role is one of interagency coordination to ensure advance program planning, compatibility of systems, the uniformity of collection methods, avoidance of duplication, and assistance to data users. Operation and maintenance of the national network are primarily the responsibility of the USGS, Water Resources Division. However, other agencies provide major funding support and, in some cases, operate and maintain portions of the national water-data network.

3. When designating representatives to the IACWD, agencies are encouraged to select senior individuals able to facilitate implementation of A-67. The representatives need to be responsible for technical oversight of hydrologic activities and able to influence policy development, planning, and resource allocation.

4. Precipitation and snow accumulation data were excluded from the requirements for coordination in A-67. At the recommendation of the National Oceanic and Atmospheric Administration through OMB, and with concurrence from numerous other affected agencies, selected precipitation and snow accumulation data-acquisition activities will henceforth be considered under the A-67 coordination program. Selected precipitation and snow accumulation data-acquisition activities which are critical to water-resources management will be indexed in the Catalog of Information on Water Data. Appropriate cooperation and liaison regarding these types of data will be maintained with the Office of the Federal Coordinator for Meteorological Services and Supporting Research and associated committees responsible for implementing OMB Circular A-62.

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5. Although the coordination of data-acquisition activities has been effective, improvements can result from improved communication at the planning stage, especially at regional and/or State levels. Therefore, OWDC and agency representatives to the IACWD will develop and implement procedures designed to improve communication between agencies at the field level while project plans and objectives are being formulated.

6. OWDC will encourage increased participation of non-Federal agencies and organizations in coordination activities. Federal agencies will participate as appropriate by seeking improved communication with the non-Federal organizations at national, regional, or local levels.

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APPENDIX D

CHARTER
FOR THE
SUBCOMMITTEE ON WATER-USE INFORMATION

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APPENDIX D

CHARTER

SUBCOMMITTEE ON WATER-USE INFORMATION
INTERAGENCY ADVISORY COMMITTEE ON WATER DATA

September 12, 1984

1. ESTABLISHMENT

The Subcommittee on Water-Use Information was established on June 25, 1984, by a memorandum of the Chairperson of the Interagency Advisory Committee on Water Data (IACWD).

2. PURPOSE

The Subcommittee is established to serve as a forum for the exchange of information on water use among professional persons involved in water-use data acquisition, investigation, and research, and to provide guidance to the IACWD on water-use information. The Subcommittee will enhance the usefulness of water-use data through such means as facilitating coordination and cooperation between agencies and organizations in development of surveys and other data collection, recommending methods for standardizing definitions of the variables used in data collection, and encouraging data gatherers to describe the methods used in their collection as a basis for understanding the quality of the data produced.

3. MEMBERSHIP

Membership is open to all Federal agencies. Agency representatives and one or more alternates will be named by the member agencies. Other agency personnel may participate in the Subcommittee meetings as observers.

4. CHAIRPERSON

The Chairperson will be elected by and from the membership of the Subcommittee on Water-Use Information for a 1-year term and shall appoint a Secretary for the term of office.

5. PROCEDURES

A. Meetings of the Subcommittee shall be held as often as necessary as called by the Chairperson, but at least once every 4 months.

B. The Chair agency is responsible for all appropriate administrative matters, such as duplicating and distributing meeting summaries and notices.

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C. Reports, with appropriate recommendations for action, will be submitted to the IACWD at the annual meeting of the Committee and upon the completion of any special assignments.

D. Summaries of meetings will be prepared to record the actions of the Subcommittee. A copy of each meeting summary will be transmitted to agency representatives, their alternates, and to the Executive Secretary of the IACWD.

E. Agency representatives of the Subcommittee shall be responsible for keeping their agencies advised of the Subcommittee's activities.

6. WORKING GROUPS

Working groups will be established by memorandum of the Chairperson to support the purposes of this Subcommittee. The composition, responsibilities, and term of each working group will be defined by the Chairperson as the occasion demands.

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APPENDIX E

INTERAGENCY WORKSHOP FOR HYDROLOGIC FORECASTING-RECOMMENDATIONS AND PROPOSED ACTIONS

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Workshop on
"Hydrologic Models Applicable to Water-Supply Forecasting"
March 20-23, 1984

In mid-March of 1984, a group of hydraulic engineers and hydrologists from nine Federal agencies met in Denver for a workshop on "Hydrologic Models Applicable to Water-Supply Forecasting." An agenda, list of participants, and a summary of recommendations follows.

Objectives for the workshop included:

1. Exchange information on hydrologic model development.

2. Identify and discuss hydrologic modeling problems common to Federal agencies.

3. Develop recommendations for solving hydrologic modeling problems.

4. Encourage the establishment of voluntary interagency working groups to make needed studies and develop recommendations for handling selected problems where existing mechanisms for resolving problems have not proven adequate.

A feature of this workshop was work group discussion of modeling problem areas, particularly those that impact on more than one agency. The work groups identified problem areas by priority and developed recommendations. Recommendations and proposed actions including how, when, and who may assist in the problem solution are attached for your information. We will appreciate your support of proposed involvement of your staff in working groups or other proposed activities as it appears appropriate.

A strong catalyst for developing an increasing level of interagency coordination in hydrologic modeling work is that all Federal agencies are faced with rapidly changing technology combined with diminishing resources. It is our hope that, through coordination and cooperation on an interagency basis, our limited resources can go further in solving common or overlapping problems.

In many cases, ability to collect data is outstripping the ability to manage data efficiently. All agencies at the workshop expressed a need for a common data-management system that will permit efficient and timely exchange of data.

It is recognized that there are existing mechanisms for improving or increasing coordination between Federal agencies involved in water-resource data collection and water-resource management activities. Organizations, such as the Office of Water Data Coordination (OWDC), U.S. Geological Survey, and the Office of the Federal Coordinator for Meteorology (OFCM) serve as useful umbrellas for a number of technical interagency subcommittees whose primary function is coordination. These technical groups will be used to the maximum practicable extent. However, workshop participants felt that in addition to actions that might be taken at the Washington level, through existing subcommittees of OWDC and OFCM, there is a need for interagency working groups with field level representation that could meet frequently enough to develop solutions to common problems.

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AGENDA
WORKSHOP ON
"HYDROLOGIC MODELS APPLICABLE TO WATER-SUPPLY FORECASTING"
March 20-23, 1984
Denver, Colorado

March 20, 1984	Chairman - Bob Rallison	Discussion Leader
8:00 a.m.	Welcome	Leon Hyatt
8:15 a.m.	Introductions & Objectives of Workshop	Bob Rallison (SCS)

AGENCY PRESENTATIONS ON CURRENT STATUS OF HYDROLOGIC MODELS

8:30-9:30 a.m.	Soil Conservation Service	
	Overview Modeling Activity	B. Shafer
	Model Input	J. Marron
	Model Processes	D. Jensen
	Model Output	K. Jones
	User Relationships	T. George
9:30-10:00 a.m.	BREAK	
10:00-12:00 p.m.	National Weather Service	
	Overview of Modeling Activity	M. Hudlow
	NWSRFS (Version 5)	G. Day
	ESP	D. Westnedge
12:00-1:00 p.m.	LUNCH	
	Chairman - Ted Engman	
1:00-2:00 p.m.	Bureau of Reclamation	J. Wensman, A. Ball
	Use of Forecast Information	B. Lane
	Corps of Engineers	
	Overview of Modeling Activity	M. Tseng
	Data Collection Activities	D. Legg
	SSARR Model	D. Speers
3:00-3:30 p.m.	BREAK	
3:30-4:30 p.m.	Corps of Engineers	
	Modeling in an Urban Area	L. Murphy
	Software Development	A. Pabst
4:30-5:00 p.m.	Forest Service	
	Overview of Modeling Activity	S. Ponce

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March 21, 1984	Chairman - Ming Tseng	Discussion Leader
8:00-10:00 a.m.	U.S. Geological Survey	
	Overview	A. Lumb
	Modeling Activity	G. Leavesley
	Instrumentation and Communication	W. Shope, Jr.
10:30-11:30 a.m.	Bureau of Land Management	
	Overview	C. Gebhardt
	Geographic Information System	J. Foster
11:30-11:45 a.m.	National Park Service	
	Overview of Water Resources	M. Flug
11:45-1:00 p.m.	LUNCH	
	Chairman - Leon Hyatt	
1:00-3:00 p.m.	Agricultural Research Service	
	Snowmelt Runoff Model	A. Rango
	Snowmelt Subroutines in SPUR Model	K. Cooley
	Small Watershed Model	D. DeCoursey
	Comparison of Model Performance WMO Project	A. Rango
3:00-3:30 p.m.	BREAK	
3:30-4:00 p.m.	Discussion of WMO Project Results	
4:30-5:00 p.m.	Work Group Assignments and Discussion	R. Rallison

March 22, 1984

Work groups meet separately. Each Chairman should designate a recorder to keep complete notes of significant work group discussions, conclusions, and recommendations.

March 23, 1984	Chairman - Bob Rallison	
8:00-9:30 a.m.	Work Groups Presentation and Discussion	
9:30-10:00 a.m.	BREAK	
10:00-11:30 a.m.	Responses from Participating Agencies	
11:30-12:00 p.m.	Wrap-up	R. Rallison

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LIST OF PARTICIPANTS

Name	Agency	Location	FTS Phone No.
Norman Miller	SCS	Washington, D.C.	475-5334
William Shope	USGS/WRD	Reston, VA	928-6014
Alan Lumb	USGS/WRD	Reston, VA	928-6838
Dave Westnedge	NWS/RFC	Salt Lake City, UT	588-5130
Ming Tseng	COE/Off. of Chief	Washington, D.C.	272-0224
Larry Murphy	COE/MO River Div.	Omaha, NE	864-7358
Doug Speers	COE/N. Pacific Div.	Portland, OR	423-3756
Ralph Hight	COE/Tulsa Dist.	Tulsa, OK	745-7209
Don Jensen	SCS	Portland, OR	423-2843
James Marron	SCS	Portland, OR	423-2843
Ann Ball	BR	Salt Lake City, UT	588-3308
Harry Taylor	BR	Boise, ID	554-1427
Joe Wensman	BR	Boise, ID	554-1427
Bill Lane	BR/E&RC	Denver, CO	234-4764
Mike Cowan	BR/E&RC	Denver, CO	234-2028
Bob Rallison	SCS	Washington, D.C.	447-5889
Al Rango	ARS	Beltsville, MD	344-3490
Ted Engman	ARS	Beltsville, MD	344-3490
Mike Hudlow	NWS	Silver Spring, MD	427-7904
Ken Jones	SCS	Portland, OR	423-2843
Mike Gillespie	SCS	Denver, CO	837-3258
Marshall Flug	NPS/Water Res. Lab	CSU/Ft. Collins, CO	(303) 491-7936
Stan Ponce	FS	Ft. Collins, CO	323-1417
Karl Gebhardt	BLM	Boise, ID	554-1892
Jay Day	NWS	Silver Spring, MD	427-7640
George Comer	SCS	Lanham, MD	436-8935
David Legg	COE/Ohio River Div.	Cincinnati, OH	684-3072
Art Pabst	COE/HEC	Davis, CA	448-3285
Donn DeCoursey	ARS	Ft. Collins, CO	323-5238
Keith Cooley	ARS	Boise, ID	554-1363
Charles Troendle	FS	Ft. Collins, CO	221-4390
Tom George	SCS	Washington, D.C.	447-5424
Bernard Shafer	SCS	Portland, OR	423-2843
William Jackson	BLM	Denver, CO	234-2374
George Leavesley	USGS	Denver, CO	234-4175
Leon Hyatt	BR	Denver, CO	234-5311
Richard Paulson	USGS/WRD	Reston, VA	928-6014
Fred Theurer	SCS	Ft. Collins, CO	323-5238

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Workshop on Hydrologic Models Applicable
to Water-Supply Forecasting
March 20-23, 1984 . . . . Denver, Colorado

Proposed Actions to Implement Recommendations
Developed by Working Groups

PRIORITY I

Recommendation 1: Adopt Standard Hydrologic Exchange Format (SHEF) for data exchange among Federal agencies.

Proposed Action: Present recommendation to Chairman of Interagency Advisory Committee on Water Data (IACWD), Subcommittee on Water Data and Information Exchange (WDIE). Chairman of WDIE will coordinate activities with the Automated Weather Information Systems (AWIS) working group under the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR).

Encourage WDIE action prior to Ootober 1, 1984. In addition, send recommendation to Chairman, IACWD, and Chairman, ICMSSR. If WDIE action is not likely by October 1, 1984, develop an interagency agreement between concerned agencies. National Weather Service (NWS) and Corps of Engineers (COE) already have an agreement referred to as TRADE (Test Reliability of Automated Data Exchange) program. Staff from SCS, USGS, BLM, and BOR together with NWS and COE representative have met recently in Salt Lake City and Portland, and are making progress toward resolving agency differences in implementing SHEF.

Recommendation 2: Adopt a standard automated data exchange communications protocol by January 1, 1985.

Proposed Action: Present recommendation to Chairman of WDIE, who will coordinate with the appropriate working group(s) under ICMSSR. Encourage WDIE action prior to January 1, 1985. Recommendations will be sent to Chairman, IACWD, and Chairman, ICMSSR.

Recommendation 3: Hydrometeorologic data archiving for public access should remain with the agencies who currently have that responsibility (e.g., the USGS for water data, NOAA for hydrometeorological data, SCS for snow data), but access should be significantly improved.

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Proposed Action: Present recommendation to Chairman of WDIE as an item for discussion. The Chairman of WDIE should coordinate activities with the appropriate subcommittee under ICMSSR. Encourage WDIE to define an appropriate level of public access by type and purpose of information. Individual agencies through their WDIE representatives to work toward achieving that goal.

Findings and recommendations of the WDIE should be submitted to the Director, National Climatic Data Center (NCDC) for review and comments.

Following review by NCDC, findings of WDIE will be distributed to concerned agencies via minutes and presented to the IACWD and ICMSSR.

Recommendation 4: Any systematic hydromet data-collection effort launched by a Federal agency must include provisions for archival of data. Archiving may be performed by another Federal agency other than the one collecting the data initially, but data should be made available to the public through automated means.

Proposed Action: Present recommendation, as an item for discussion, to Chairman of WDIE, who will coordinate with the appropriate working group(s) under ICMSSR. Determine whether this is perceived as a problem among Federal agencies. Report findings in minutes of Subcommittee, circulate to NCDC for review and comment. Distribute findings to concerned agencies, IACWD and ICMSSR as appropriate.

Recommendation 5: Interagency access to operational data and analytical products needs to be strengthened.

Proposed Action: Under existing interagency cooperative agreements establish an ad hoc working group with field representation to:

(1) determine the availability and source of operational data used by Federal agencies to support various agency responsibilities,
(2) develop a reference of analytical products currently used by Federal agencies to support agency operational responsibility, and
(3) propose ways to improve interagency access to operational data and analytical products.

Working group members to be selected from "regional" level staffs after authorization by management. Selection by each interested agency. Working group to be named by January 1, 1985.

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Recommendation 6: Consider the effects of the current computer age on the exchange of data and/or forecast products. Questions which need to be addressed are:

(a) How should data and/or forecast products be exchanged?
(b) Which agency users are allowed access to which Federal computer system?
(c) What types of data and/or forecast products should be made available to which agency users?
(d) What information should be released in real time with little or no verification?

Proposed Action: Proposed action under Recommendation 5 includes establishing an ad hoc working group with field level representation by January 1985. The working group could also address items (a) through (d) in Recommendation 6, and prepare recommendations to be sent to Chairman of IACWD, and Chairman of ICMSSR. Depending on how quickly Recommendations 1 and 2 are resolved, the working group, which may include the same agencies and personnel that have been working to resolve questions on SHEF, may also address unfinished items for Recommendations 1 and 2. Several agencies expressed a preference for one working group to address the question of exchange of operational data, products, and graphics in real time.

Recommendation 7: Develop a standard format for the exchange of graphic products.

Proposed Action: Refer recommendation to Chairman of WDIE with note that a standard format already exists, prepared under the auspices of the Federal Coordinator for Meteorological Services and Supporting Research in a document entitled, "Standard Formats for Weather Data Exchange Among Automated Weather Information Systems," U.S. Department of Commerce, NOAA, FCM-52, August 1982. WDIE should review this document, determine its adequacy for a broad range of graphic products and propose improvements as needed in coordination with AWIS or ICMSSR.

Recommendation 8: Current hydrologic simulation models need better conceptual representation in the following areas:

(1) Precipitation Form--need to improve on present temperature methods of selecting rain or snow.
(2) Energy Fluxes--the addition of energy relationship associated with radiation and wind should improve results obtained using temperature index alone.

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(3) Lapse Rate--standard temperature lapse rate is not always appropriate - need to include information on air mass or have more measurements representing a range of elevation bands.
(4) Snow Depletion Curves or Relationships--better depletion relationships are needed when areal coverage is missing and during forecasting.

Proposed Action: Modelers in both research and operations agencies should exchange information on currently used methods. USGS and ARS should include these problem areas as potential research items to the extent possible in 1985 plans of work. The other agencies involved in modeling activities should include these problem areas in their research and development plans as soon as feasible.

Recommendation 9: Agencies involved in modeling should, as a minimum, use the following verification criteria when comparing results from a hydrologic simulation model against measured data.

(1) Coefficient of determination
(2) Measure of volume error
(3) Sum of absolute differences
(4) Accumulative error
(5) Hydrograph plot
(6) Plot of residuals
(7) Sensitivity analysis
(8) Data base should be representative--including high and low years.

Proposed Action: USGS model development staff at Denver is currently involved in hydrologic modeling that will require verification. Suggest that a "sample" using the recommended criteria be developed by USGS staff and circulated to all interested Federal agencies. Complete in accordance with World Meteorological Organization (WMO) study schedule.

Recommendation 10: Incorporate into hydrologic simulation models data such as (1) snow-water equivalent; (2) areal snow coverage; (3) soil moisture; and (4) melt characteristics.

Proposed Action: Staff involved in model development (USGS, SCS, ARS, NWS, COE) should determine the sensitivity of current models to the addition of parameters listed in the recommendation. Data-collection agencies should arrange to collect and disseminate the required data in a timely and efficient manner using previously agreed to data format. Advise agency representatives to the Agristars project of this recommendation and solicit their ideas of how this recommendation could be handled.

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Recommendation 11: Design, develop, and adopt standard data files and utility subroutines to put, store, and get the following types of data for model applications:

(1) time series
(2) channel and reservoir characteristics
(3) land characteristics
(4) drainage networks

Proposed Action: Establish an ad hoc working group from interested Federal agencies to review, modify, and select a design for each of the four types of data. Develop a plan for implementing the design.

Recommendation 12: Develop complete data sets of a representative sample of watersheds that have existing data. The data sets would be used for research, testing existing models, and evaluation of new algorithms for the various hydrologic processes.

Proposed Action: Establish an ad hoc working group from interested Federal agencies to develop criteria for selection of watersheds, identify a central location for cataloging and/or storage and dissemination of the data sets. Each agency should recommend candidate watersheds for review and selection by the work group.

PRIORITY 2

Recommendation 13: Identify accuracy requirements in terms of application. Establish resolution standards for precipitation and temperature sensors used in flood forecasting and seasonal water-supply forecasting applications.

Proposed Action: Operations agencies (NWS, COE, BOR, SCS) define accuracy requirements for operational needs. Data-collection agencies (NWS, USGS, SCS) establish resolution standards for precipitation sensors. The COE and NWS should jointly take leadership for defining accuracy requirements for operational needs (will vary dependent upon use) and for establishing resolution standards for precipitation sensors. SCS should take leadership for establishing resolution standards for snowpack sensors. Complete by June 1985.

Recommendation 14: Evaluate comparability between precipitation and temperature sensors to determine their applicability for operational modeling and streamflow forecasting.

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Proposed Action: Workshop agency representatives (NWS, SCS, USGS, ARS) contact the individual or individuals within their agency responsible for precipitation and temperature sensors. Encourage staffs to exchange information on characteristics of sensors useful for evaluating comparability such as accuracy, reliability, precision, etc. NWS take lead on this and circulate results of findings to all Federal agencies that have a concern.

Recommendation 15: Determine the correlation between snow courses and SNOTEL sites to enable estimates to be made of manually collected data from automated sites.

Proposed Action: SCS staff in Portland, Oregon, should develop suitable criteria and make the necessary correlations so that SNOTEL data can be used at an early date. Preliminary results to be circulated to interested agencies for review prior to finalization of procedure. SCS complete by June 1985.

Recommendation 16: Determine comparability between various techniques of obtaining areal snow cover.

Proposed Action: An interagency work group (ad hoc) should be formed with representation from concerned agencies (SCS, COE, BOR, ARS, NWS, NASA, USGS). A list of techniques used for collection and processing of snow data should be developed together with criteria for comparisons of techniques, i.e, accuracy, timeliness, costs, resource requirements, etc. This group should look at the problem from a national viewpoint. ARS would be a logical Federal agency to lead this effort.

Recommendation 17: Develop objective techniques for estimating areal snow water equivalent from point measurements and remotely sensed snow covered area.

Proposed Action: Form an ad hoc team involving NWS, SCS, ARS, FS, USGS, COE, and BOR to define the problem and develop ideas for solving the problem. Agencies select representatives from "regional" level. ARS could take on this assignment of developing objective techniques for estimating areal snow water equivalent as a quasi-research activity and share results with other agencies.

Recommendation 18: Develop objective techniques for estimating areal value from point, transect, and remotely sensed data for various hydrometeorological parameters used in forecasting.

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Proposed Action: Form an ad hoc study team involving NWS, SCS, FS, USGS, COE, BOR, and others who may be interested. Team address the following:

(1) Determine what has already been done in this area.
(2) Define problem areas in terms of future needs--new research efforts--testing of proposed techniques--pilot studies, etc.
(3) Develop a plan indicating required resources, for reaching (a) short range and (b) long-range solution.

Recommendation 19: Provide multiagency support for automated snow mapping projects that produce digital and graphic snow cover products for use in water supply and flood forecast models.

Proposed Action: SCS staff at Portland, Oregon, develop a specific proposal to which other interested agencies can review and respond in terms of moral and/or financial support. Proposal should include a review and assessment of current snow cover products and alternative ways for obtaining digital and graphic products. Include resources required to generate the products in a timely manner (initial costs, operation costs, special equipment required, etc.). Complete by January 1985.

Recommendation 20: Utilize standard coordinate system(s) for referencing hydrometeorological variables, watershed parameters, and physiographic descriptors.

Proposed Action: Bring to attention of Chairman of IACWD, and Chairman of ICMSSR, and appropriate Subcommittee and working group Chairmen.

Recommendation 21: Adapt models to incorporate remotely sensed input.

Proposed Action: Bring recommendation to attention of agencies involved in modeling activities--NWS, USGS, ARS, SCS, etc. ARS and SCS actively working on this with the NWS snow model in the NWSRFS modeling system.

Recommendation 22: Coordinate installation and discontinuance of hydromet stations with the user community through formal and informal mechanisms.

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Proposed Action: Bring recommendation to attention of Chief Hydrologist, USGS, and Director of NWS (Hydrology). Recommend discussion at the next meeting of IACWD. Any action to be coordinated with ICMSSR.

Recommendation 23: Develop objective criteria for evaluating data-collection network adequacy and projected expansion of existing networks in terms of incremental benefits to primary users of the data.

Proposed Action: USGS take lead in contacting agencies to determine what has already been done on this subject. The USGS, COE, and NWS have completed network studies. If meeting appears desirable, national representatives could meet and discuss what else could be done. SCS submit a report on objective criteria of snow-course reduction plan when it is completed.

Recommendation 24: Implement an interactive station location and parameter file that is easily accessed and updated. The present indexing system is not adequate primarily due to lack of coordination, difficulty in updating current station files, and structure of the indexing system.

Proposed Action: Bring to attention of Chairman of IACWD, with recommendation that he contact appropriate staff involved in indexing and updating current streamgage files. Concept must be expressed in greater detail in order for USGS to respond.

File management involves all hydrometeorological data and a solution will involve input from both data user and data archiving groups. Problem could be discussed at both subcommittee level and by main Committees of IACWD and ICMSSR.

Recommendation 25: Encourage additional research on processes as they are applied to better define or represent the following items in hydrologic simulation models.

(1) Frozen ground
(2) Evaporation, sublimation, transpiration
(3) Infiltration
(4) Albedo
(5) Spatial variation or distribution of snow
(6) Precipitation lapse-rate

Proposed Action: Recommendation will be distributed to research and development agencies and they will be encouraged to incorporate these subjects in their plans. Modelers should determine the sensitivity of their models to these items which can be used as a basis for selecting a priority for research or study.

Recommendation 26: Greater attention should be given to all aspects of technology transfer.

Proposed Action:
(1) Need to develop maps of parameter values for use when measurements cannot be made (example: Universal Soil Loss Equation (USLE) maps).
(2) Need for more special purpose informal workshops at the "grassroots level" to concentrate on specific topics (example: energy fluxes).
(3) Need more model documentation to include: range of parameter values, range of applicability, and limitations. (Field users should share in writing.)
(4) Establish data sets for specific basins in usable format for use on a variety of computers. (See Recommendation 12)
(5) Make models as physically based as possible to aid in transferability (spatially and user).
(6) Make data sets more available--especially for model testing. (See Recommendation 12)
(7) Encourage interagency data collection and model testing. (See Recommendation 11)
(8) Encourage special purpose workshops.

Recommendation 27: Encourage proper documentation of all software, including comprehensive user's manual.

Proposed Action: Recommendation will be distributed to all involved agencies.

Recommendation 28: Support model comparison studies such as those organized by WMO.

Proposed Action: Recommendation will be distributed to all involved agencies.

Recommendation 29: Encourage agencies to share procedures for determining minimum/maximum volume forecasts and associated probabilities of these forecasts.

Proposed Action: Recommendation will be distributed to all involved agencies.

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